A CASE STUDY OF POLAR BEAR CO-MANAGEMENT IN THE EASTERN CANADIAN ARCTIC

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ABSTRACT

The purpose of this thesis is to document and analyse the development of the1985 Clyde River – Broughton Island Memorandum of Understanding on Polar Bears. Based on a population estimate of 400 to 600 polar bears on Northeast Baffin Island, the quotas for Clyde River were reduced from 45 to 15, and the quotas for Broughton Island were reduced from 22 to 10. The case study approach to the analysis is organised according to various scales of analysis (from the individual to the global level) for the political, ecological, and cultural variables in the analysis. Three chapters are dedicated to a presentation of the three variables of analysis identified in the case study. The ecological variable is concerned with evaluating the biological data that were used to calculate a reduction in quotas. The political variable evaluates the structure and proceedings of the negotiation meetings, and the cultural variable evaluates the role that cultural meaning may have played in the creation of the agreement. The major finding is that a co-management approach to wildlife management does not guarantee that decision-making power is equally distributed amongst user groups and territorial agencies.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

On February 1985, after a meeting that lasted nearly sixteen hours, a new limit on the number of polar bears that could be harvested from the Baffin Bay region was established. Based on a population estimate of 400-600 polar bears, the quotas for Clyde River were reduced from 45 to 15, and the quotas for Broughton Island were reduced from 22 to 10. The agreement was the first of its kind in Canada, and in the years to come other communities in the Canadian North became signatory to similar agreements. The 1985 Clyde River – Broughton Island Memorandum of Understanding on Polar Bears represented the first time that Hunters' and Trappers' Organisations (HTOs) and the Government of the Northwest Territories (GNWT) entered into a negotiated agreement that regulated the allowable take of polar bears.

Since Canada became signatory to the International Agreement on the Conservation of Polar Bears in 1973, it has been obligated under international treaty to protect its polar bear population. This obligation carries a significant burden for two reasons: two thirds of the world's polar bear population resides within Canadian territory,

and Canada allows the highest levels of harvest by resident aboriginal peoples of the North. In 1981 it was estimated that the total circumpolar polar bear population was between 15,000 and 20,000 (IUCN 1985). Aboriginal peoples account for the majority of the polar bear harvest, and the total quota fluctuates between 650 and 680 bears annually. Canada also allows for the sport hunting of polar bears under specific circumstances, and a bear that is taken during the sport hunt is subtracted from the community's quota where the hunt was hosted. In Alaska, only aboriginal residents are permitted to hunt polar bears, and there is no limit on the numbers that can be taken. Since the passing of the Marine Mammal Protection Act, the number of bears taken each year since 1973 in Alaska ranges between 38 and 167 bears (IUCN 1985). Norway and the USSR have both declared moratoriums on the polar bear hunt in 1973 and 1950 respectively (IUCN 1985). The hunting of polar bears is prohibited for all persons except aboriginal residents in Greenland, with total annual takes averaging between 100 and 150 bears (IUCN 1985).

Among the most important issues facing Inuit today is the future of their relationship with their land and natural resources. Since the settlement of the Nunavut Land Claims Agreement, the Inuit of Nunvaut may be in a better position than at any other time in the history of their association with the Canadian Government to realise a wildlife management strategy that suits their needs.

In spite of the significance of the 1985 Clyde River – Broughton Island Memorandum of Understanding on Polar bears (hereafter the 1985 MOU), the negotiation process is not documented in the published literature. The biological data that were used to determine the new quotas remain in unpublished internal government

documents, and a formal documentation and examination of the negotiation process has never been carried out.

The formation of the 1985 MOU was an initial attempt to incorporate user groups into the decision-making structure in Canada's polar bear management strategy. However, problems of institutional design and ambiguity in the negotiation structure resulted in an agreement that may not have incorporated user groups into the decision-making structure as fully as it claimed to (Lloyd 1986). The purpose of this thesis is to evaluate the distribution of decision-making power in the formation of the 1985 MOU. It attempts to examine the effectiveness of the 1985 MOU in equally distributing decision-making power during the negotiation process, and to understand the implications that this may have for the future of the polar bear management program in Canada.

The thesis investigation is organised into eight chapters. Chapters One and Eight are the introduction and conclusion, respectively. Chapter Two includes the literature review for the thesis research, and chapter Three describes the research methodology. Three main factors of analysis (or variables) have been identified in the case study, while Chapters Four, Five and Six elaborate on these. Chapter Seven is concerned with evaluating the interconnections in the case study. The order in which the factors of analysis appear does not reflect their relative importance or value in the investigation; rather, it provides a systematic framework in which to present the data pertaining to the formation of the 1985 MOU.

1.2 Research Problem

The thesis problem is adopted from the observation that "decentralisation and devolution do not necessarily result in a shift from the state management systems to an indigenous system of self-management" (Usher 1986: 4). A co-management approach attempts to share decision-making power between local user groups and state systems in an effort to create wildlife management strategies that are able to accommodate the needs of both. The research problem that is addressed in this thesis is that a co-management approach to wildlife management does not necessarily ensure that a government shares decision-making power equally with user groups. The actual application of the co-management approach often does not resemble its theoretical construction, commonly resulting in a situation where government agencies are unwilling to give up their decision-making power, and user groups are reluctant to participate in a management program over which they have no control. It is unknown whether the root of this problem lies in the institutional structure of co-management, in the negotiation process of the management agreements themselves, or in some other area as yet undefined.

1.3 Objectives

There are three objectives in this thesis. The first research objective is to document otherwise unpublished data concerning the 1980-1985 population inventories conducted on Northeast Baffin Island by GNWT. The goal of this objective is to illustrate how these data contributed to the establishment of the quotas set by the 1985 MOU.

The second research objective is to evaluate the distribution of decision-making power in the formation of the 1985 Clyde River – Broughton Island MOU on polar bears. The goal is to understand how the distribution of decision-making power contributed to the final form of the 1985 MOU. And finally, the third objective is to evaluate the impact that the creation of the 1985 Clyde River – Broughton Island MOU has had on polar bear management in the Canadian North.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Fish and wildlife populations in the Canadian North support a strong subsistence economy. Indigenous peoples of the north, the rest of Canada, and indeed the world, value this natural resource base. As the magnitude of human activities in the north increases the conservation of this substantial resource base is now regarded as a central concern for both aboriginal peoples and northern developers.

The question of conservation of natural resources is one of the most important issues in the contemporary Canadian North. The Nunavut Land Claims Agreement (1993) has expressed a firm commitment to

> Developing an effective system of wildlife management that complements Inuit harvesting rights and priorities, and recognises Inuit systems of wildlife management that contribute to the conservation of wildlife and protection of habitat"(Nunavut Land Claims Agreement, Article 5.1.2 (e) 1993: 29).

While there is a general consensus over a commitment to the development of a sound management strategy, management to what end and by what means remains less clear (Usher 1986).

Two models of wildlife management operate throughout the Canadian North: an indigenous system and a state system. The dualism of wildlife management strategies existing in the Canadian North results in a tension between indigenous and state systems of knowing and managing wildlife. The following literature review will explore the wildlife management dualism that characterises the Canadian North.

2.2 Wildlife Management Dualism

Peter Usher (1986) has coined the phrases "state system" and "indigenous system" to characterise the dualism of wildlife management that exists in the Canadian North. Resource management systems cannot be considered independently from a system of property rights, which are in turn the fundamental political arrangement of society.

The state system of wildlife management rests on a common property arrangement "in which the state assumes exclusive responsibility and capability for managing a resource equally accessible to all" (Usher 1986: 2).

> The state manages for certain levels of abundance on a technical basis, and then allocates shares of this abundance to users on an economic and political basis. The system of knowledge is based on scientific accumulation, organisation, and interpretation of data, and management problems are resolved in a technical, ahistorical, and "value-free" framework. This system of management is bureaucratic, which is to say hierarchically organised and vertically compartmentalised (Usher 1986: 2).

The prerogative to manage the fish and wildlife rests with the Crown in the Right of Canada. The Crown lands that are held in trust are treated as a common resource, whereby the resources are not the property of any one individual but instead are available to anyone who may have an interest in the resources. The tragedy of the commons philosophy, as outlined in Hardin's (1968) influential work, outlines the basic foundations of state management of wildlife. Hardin (1968) argued that the rational economic

individual, seeking to maximise personal gain, would exploit a resource held in common without consideration of the needs of others. The "take what you can get" philosophy eventually leads to the wholesale destruction of the resource, thus the tragedy. An option to avert this tragedy, aside from privatisation, is to increase state regulation over the use of common property resources.

The tragedy of the commons concept has been criticised for being overly mechanistic and deterministic, overlooking the role of individuals as social beings and the ability of groups to self-regulate their exploitation of a resource (Berkes 1988; Brox 1990; McCay and Acheson 1988). Berkes (1988) points out that the social control exerted by a society is likely to encourage one to behave in a socially responsible manner, especially with regard to local user groups such as hunter and gatherers. The tragedy does not apply to all common property resources (Ostrum 1988; Pinkerton 1992). The high level of regulation that economic-based management requires is very costly, and often impractical in a vast and remote region (Osherenko 1988).

In contrast to state systems of managing wildlife, the indigenous system that is practised in the Canadian north is based on communal property arrangements, "in which the local harvesting group is responsible for management by consensus" (Usher 1986: 3). Property rights rest within the group and are based on the continuous occupancy of a region. A group's connection with an area is defined in terms of knowledge, naming, travel, foraging, and residence (Usher 1984: 396). The land and its resources are the communal property of the group, with no individual denied access. Inuit cosmology does not conceptualise property in terms of ownership, but rather in terms of a person belonging to the land (Usher 1984). Leadership and authority to make decisions rest upon

the individual's acquisition of knowledge and consensual decision-making. Decisions are based on an accumulation of experience, and are not ranked in terms of greater or lesser importance (Gunn *et al.* 1988). Wildlife harvesting in the indigenous systems is part of an integrated complex in which consumption and use of wildlife are part of the social structure, cultural value systems, and economic systems. The relationship between wildlife and aboriginal people is an integrated whole in which harvesting activities are intimately related to social structure and obligations (Berkes 1988; Fiet 1988).

There are a number of problems with the dualistic approach of the state and aboriginal systems of property rights and regulating access to resources. The state system of management, based on regulation of rights to access, is fundamentally ill-suited to native communities (Nakashima 1991). It often relies on cumbersome paperwork (licenses, harvest tickets, and quotas), which is impractical in communities where many hunters are not fluent in the language in which the rules are printed (Osherenko 1988b). Ultimately it enforces by forfeiture, seasonal limits, and legal restriction rather than by social pressure to conform to community standards (Osherenko 1988b).

2.3 Regulating Consumption

Regulating the consumption of wildlife in the Canadian North has come under the jurisdiction of various agencies. The British North America Act of 1867 effectively conferred jurisdiction over wildlife resources to the provinces. However, it was not until 1948 that the Northwest Territories (NWT) acquired jurisdiction over wildlife, as outlined in the Game Ordinance of 1949 (Clancy 1990). Though the Game Ordinance was passed in 1949, it was not until 1967 that administrative and enforcement staff were

transferred from Ottawa to the NWT. At that time, game management fell under the territorial jurisdiction of the Game Management Service (GMS).

Between 1975 and 1980, one of the most pressing issues facing the NWT legislature was a long overdue revision of the 1949 Game Ordinance. In an effort to incorporate public opinion into the new Game Ordinance, the GMS solicited community views on the existing statute and prospective revisions (Clancy 1990). Drafts were circulated publicly in an effort to solicit public input into the revision process. One of the most important results of the revised Game Ordinance was that it "gave legal sanction to a more flexible, community sensitive regulatory regime" (Clancy 1990: 85).

In an attempt to cultivate a relationship with the hunting and trapping constituency, the GMS began the process of encouraging the organisation of local hunters and trappers into Hunters' and Trappers' Associations (HTAs) (later renamed as Hunters' and Trappers' Organisations, (HTOs)), which were to play a critical role in the development of wildlife management policy in the years to come (Clancy 1990). While originally intended to serve in an advisory capacity to the GMS, the HTAs were recognised as "official community spokesmen on all matters concerning the renewable resources of their area" (Clancy 1990: 80). By 1977 an initial program, consisting of trapper assistance and loans for community hunts and outpost camps, was well underway (Clancy 1990). The establishment of the HTAs dovetailed with a government-wide initiative announced by the GNWT commissioner in 1976 to devolve and decentralise as many programs as practicable to the local level. The HTA network was being transformed, at least in part, from an advisory to an administrative apparatus (Clancy 1990: 80).

The revised Game Ordinance was approved in 1978 and enacted the following year (Clancy 1990). As GNWT continued to pursue its agenda of decentralisation and devolution, debates over wildlife management continued. As Clancy (1990) explains, "embedded in the devolution debate of the early 1980s was a fundamental ambiguity, which turned on the precise degree of decision making power to be retained by the Department of Renewable Resources (DRR)"(Clancy 1990: 86). While DRR was to retain ultimate responsibility for wildlife research, there existed significant ambiguity in the relative decision-making powers of the HTAs and DRR. Attempts to establish joint management, or co-management, regimes took hold in an effort by Native resource users to claim a more direct role beyond the advisory capacity in the decision-making process over wildlife management.

Usher (1988) argues that a meaningful and successful management policy must necessarily include indigenous systems of knowing and participating in a meaningful engagement with wildlife. It has been argued that devolution has provided for the movement of authority and responsibility for state management from a higher to a lower level of government. The establishment of the HTAs essentially provided a means to decentralise administrative responsibility, without delegating any significant decision-making power over policy. State management systems have not been sacrificed in favour of indigenous systems of managing and using wildlife (Usher 1986).

Throughout Canada co-management has become widely recognised and used by aboriginal peoples as a means for managing resources (AINA 1995; Notzke 1994). Co-management regimes[1] are defined as "an arrangement in which government authorities

[1] For clarification, regime is "social institutions of agreed-upon principles, norms, rules, and decision-making procedures that govern the interactions of actors in specific areas" (Young and Osherenko 1993:1).

share power with indigenous user groups" (Osherenko 1988b: 94). Clancy (1990: 87) says, "on the one hand joint management addressed the question of power sharing in claims settlements. On the other hand, it offered a means to extend popular involvement in the wildlife regime beyond its previous limits". The concept of joint decision-making looked beyond conflicting bids for exclusive control by either the state or indigenous parties towards a collaborative form of control for a mutually beneficial result. However, questions of basic institutional design and power sharing were to trigger major bureaucratic resistance "at precisely the point where guaranteed rights to be consulted and to advise gave way to guaranteed rights of final decision" (Clancy 1994: 88).

Fundamental questions of institutional design are unanswered in the exercise of the co-management (or joint management) approach to managing wildlife. In other words, "the conjunction of convergent expectations and patterns of behaviour or practice" (Young 1982: 16) that is fundamental to any institution-based resource regime is ambiguous in many existing co-management strategies. This ambiguity is one of the reasons that management strategies that are not satisfactory to all signatory parties.

Usher (1986: 117) argues that it is the indigenous systems that native people have always wanted "and that they themselves have always demanded for the last fifteen years". He also argues that such a system is essential for the conservation of wildlife in the north (Usher 1981, 1984). There are concrete reasons why the existing mechanisms of devolution do not guarantee the facilitation of self-determination for northern aboriginal peoples. The first is that joint management boards are unequivocally accountable to the respective government ministers, rather than to the harvesters or native peoples as a group. Secondly, it is not clear whether any regulations operating according to the

indigenous system of knowing and relating to natural resources will result from a policy of devolution.

2.4 Discussion

The International Agreement on the Conservation of Polar Bears was signed by the five circumpolar nations: Canada, Denmark (Greenland), Norway, USSR, and the United States of America (Lentfer 1973; Taylor and Lee 1995). In response to a perceived crisis over the status of the polar bear population due to increased harvest levels, the circumpolar nations negotiated an agreement that called specifically for sound management based on the best available scientific evidence (Fikkan *et al.* 1993). In the years that followed, this agreement was to serve as justification for funding polar bear research n the NWT. While it was stated in the agreement that native peoples are entitled to priority rights to the harvesting of polar bears, the actual terms of those rights is ambiguous.

It is quite possible that the outcome of NWT wildlife management policy initiatives may prove ineffectual and in fact counterproductive to the original aims and objectives of a sound wildlife management program: to ensure that a resource is available for future generations. Improved prospects for conservation do not necessarily follow from a state policy of devolution. We have seen that devolution is primarily concerned with the transfer of administrative responsibility from the top down: that is, from territorial government towards local, community-based organisations. However, increased administrative responsibility in the hands of local user groups does not necessarily serve to integrate aboriginal ways of knowing and managing wildlife with a

state system. In fact, devolving territorial administration to the communities may reduce opportunities for indigenous people to alter existing wildlife management strategies to ones that more closely reflect indigenous ways of knowing and managing wildlife.

This is not to advocate the abolishment of the state system of managing wildlife. It is to suggest that the dominance of the state system may prevent the inclusion of aboriginal systems in a wildlife management program that would mutually benefit all parties and make the goal of conservation more attainable. The precise distribution of decision-making power during co-management negotiations is not well understood. This thesis attempts to evaluate the effectiveness of the co-management approach in distributing decision-making power equally amongst user groups and state agencies.

CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter is concerned with research design, reviewing the study area, data collection methods, and data analysis methods. The thesis flow chart is considered, which was used as a conceptual tool in designing the structure of the thesis research. The research design is a case study approach, and the communication matrix was used as a tool to organise the data collection. The last section of this chapter reviews the structure adopted for the data analysis, which involves describing the interrelationship between the variables of analysis, the levels of analysis, and the data sources.

3.2 Study Area

The study area is located on northeastern Baffin Island in the eastern Canadian Arctic and includes the wildlife management zone of the Baffin Bay population of polar bears. In 1985, the Baffin Bay polar bear management zone contained the communities of Clyde River (70°28' N, 68°36' W) and Broughton Island (67°33' N, 64°02' W) (see Figure 3.1). This study area was chosen because Clyde River and Broughton Island were the first communities in Canada to negotiate a management agreement on the harvest of polar bears.

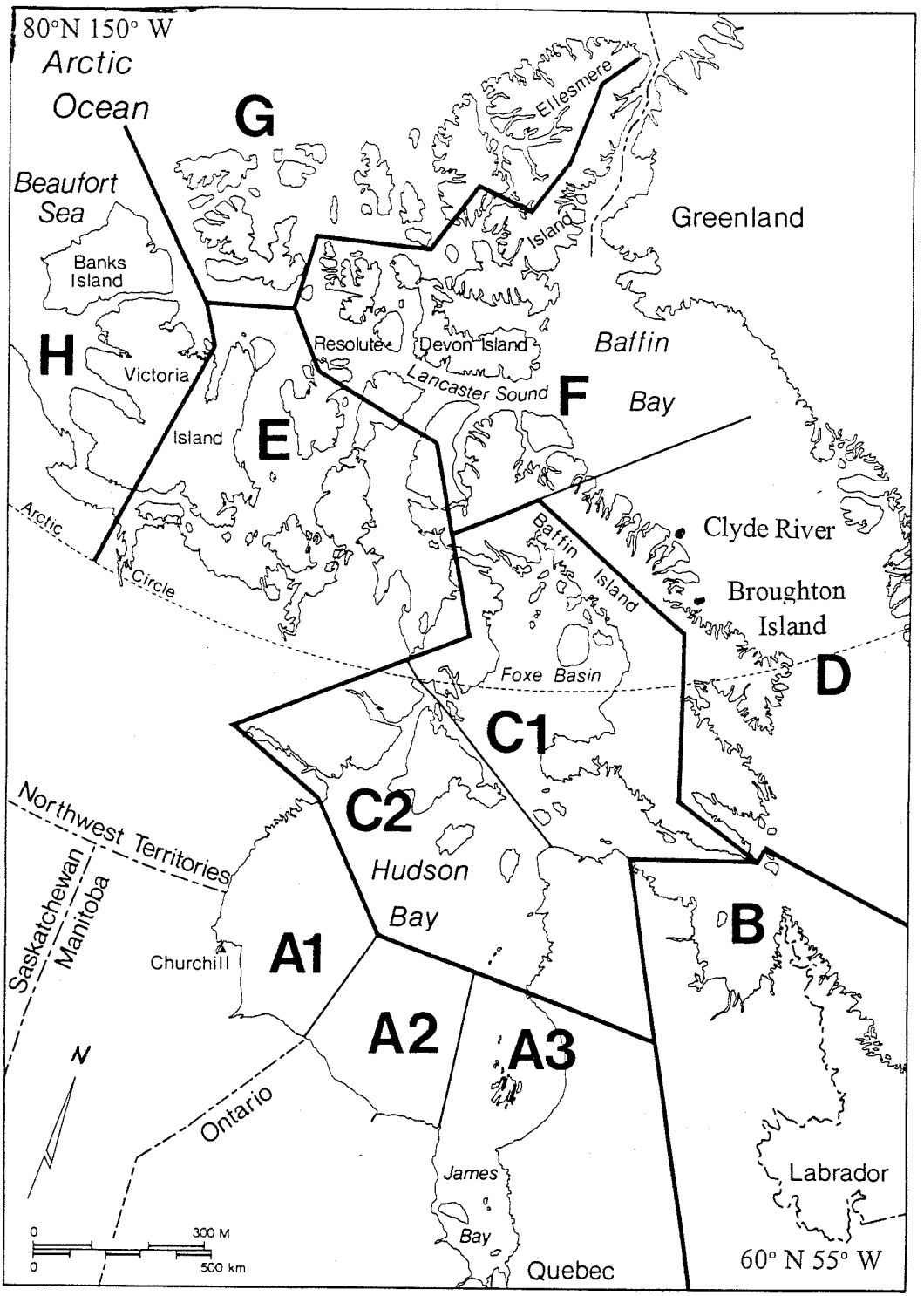

Figure 3.1: Map of study area and polar bear management zones in Canada (adapted from Stirling 1988). Note: these are not current (as of 1995) population boundaries, but rather those that were in place at the time the 1985 MOU was created).

3.3 Structure of Thesis Research

Figure 3.2 is a flow chart of the thesis case study where each box represents a component of the case study.

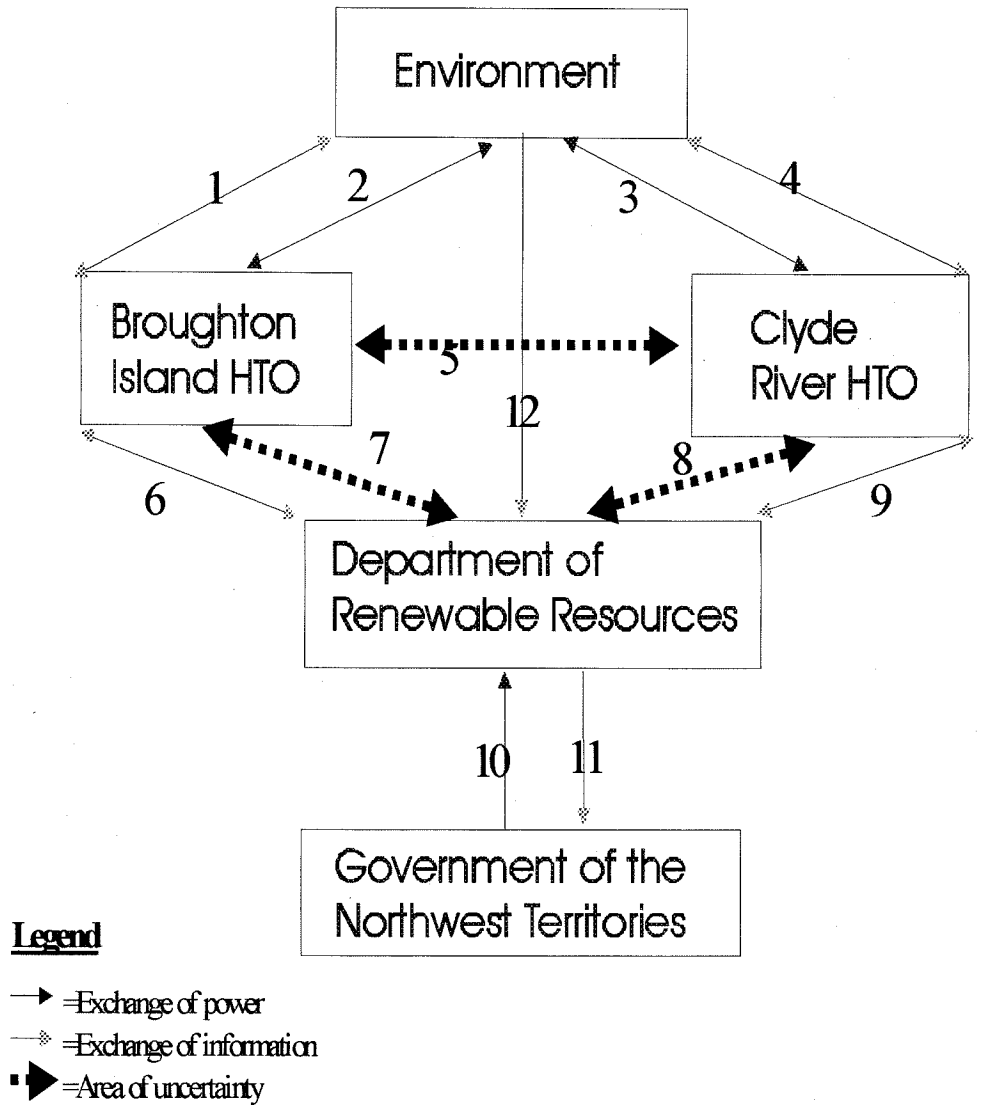

Figure 3.2: Thesis flow chart. Numbers indicate labels for each of the flow areas in the chart.

The light grey lines indicate flows of information and the black lines indicate exchanges of power or influence. The dashed flow lines indicate the areas of uncertainty addressed in the thesis research. For example, the dashed flow line between the Broughton Island HTO and Renewable Resources indicates uncertainty in the degree of power exchange from the HTO to Renewable Resources. The thesis flow chart is an organisational tool that helps to conceptualise the case study in terms of an interrelated dynamic. For clarification, power is defined as the ability to cause change.

3.4 Research Design

The research design follows a case study approach, defined as "an observation of a single group at one point in time, usually subsequent to an event that allegedly produced change" (Nachimas and Nachimas 1976). The case study examined in this thesis is the negotiation of the 1985 Clyde River – Broughton Island MOU on polar bears. The case study data presented in chapters 4 through 6 provide a baseline of data to analyse the interconnected dynamics of policy, ecology, and culture involved in the formation of joint management agreements for polar bears in the Canadian Arctic.

3.5 Data Sources: Field Methods

The communication matrix (Figure 3.3) is a tool that facilitates the collection of data while in the field. The device is drawn as an intersecting grid that shows not only who interacts with whom, but the manner in which they interact (Werner and Schopfle 1987). The three main categories of data that were used to construct the case study are interviews, unpublished government archival sources, and published literature. The

published literature sources were gathered from journals, books, newspapers, technical committee meeting reports, and occasional government agency reports. The unpublished government data examined for the case study include interdepartmental correspondence, technical reports, and raw data on polar bear population inventories obtained from the Renewable Resources archives located in Iqaluit, Nunavut.

	Broughton Island HTO	Clyde River HTO	Polar Bear Biologist	GNWT	Researcher
Broughton Island HTO	-Interview	-Interview -Meeting minutes	-Meeting minutes	-Correspondences -Interview -Published literature	-Interview
Clyde River HTO		-Interview	-Meeting minutes -Interview	-Correspondences -Interview -Published literature	-Interview
Polar Bear Biologist			-PBTC -Published material -Unpublished reports	-Correspondences	-Archival data
GNWT				-Correspondences	-Archival data
Researcher					Committee meetings

Figure 3.3: Communication matrix for data collection (adapted from Werner and Schopfle 1987)

The interview information was collected during June and July of 1997 and 1998 in the communities of Clyde River, Broughton Island, and Iqaluit. Semi-directed

interviews were conducted in English with members of the Hunters' and Trappers' Association of Clyde River and Broughton Island. The interview structure was informal; no questionnaires were distributed. The interviews were recorded using a small tape recorder and were later transcribed. An informal interviewing technique was utilised for two reasons. The first reason was to allow the persons being interviewed the opportunity to contribute pertinent information as he/she saw best, and the second reason was to incorporate as much flexibility into the interviewing process as possible.

Before the interview began, the interviewee was informed that his/her anonymity would be protected, i.e. his/her name would not be attached to their statements. The interviewee was paid for his/her time, and it was stated that participation in the study was entirely voluntary and that he/she could leave the study at any time they wanted. These statements are included in the participant consent form, approved by both the Ethical Review Committee at the University of Saskatchewan and the Nunavut Research Institute.

3.6 Data Analysis

The objective of the methodological approach is to provide a systematic framework in which to integrate various levels of analysis of the social and environmental factors relevant to the formation of the 1985 MOU on polar bears. The goal is to integrate micro-level studies (the individual and community interviews) with a series of macro-level data sets (territorial, regional, national, and global).

Both theoretical considerations and the construction of the levels of analysis influenced the choice of the specific level of analysis from which data were gathered. For example, GNWT recorded information relating to the development of the 1985 MOU

in interdepartmental correspondence and internal reports. The information available in these reports is restricted to its intended audience (i.e. other civil employees), and has limited utility in providing data for other levels of analysis. Figure 3.4 illustrates the relationship between levels of analysis, relevant factors (or variables), and data.

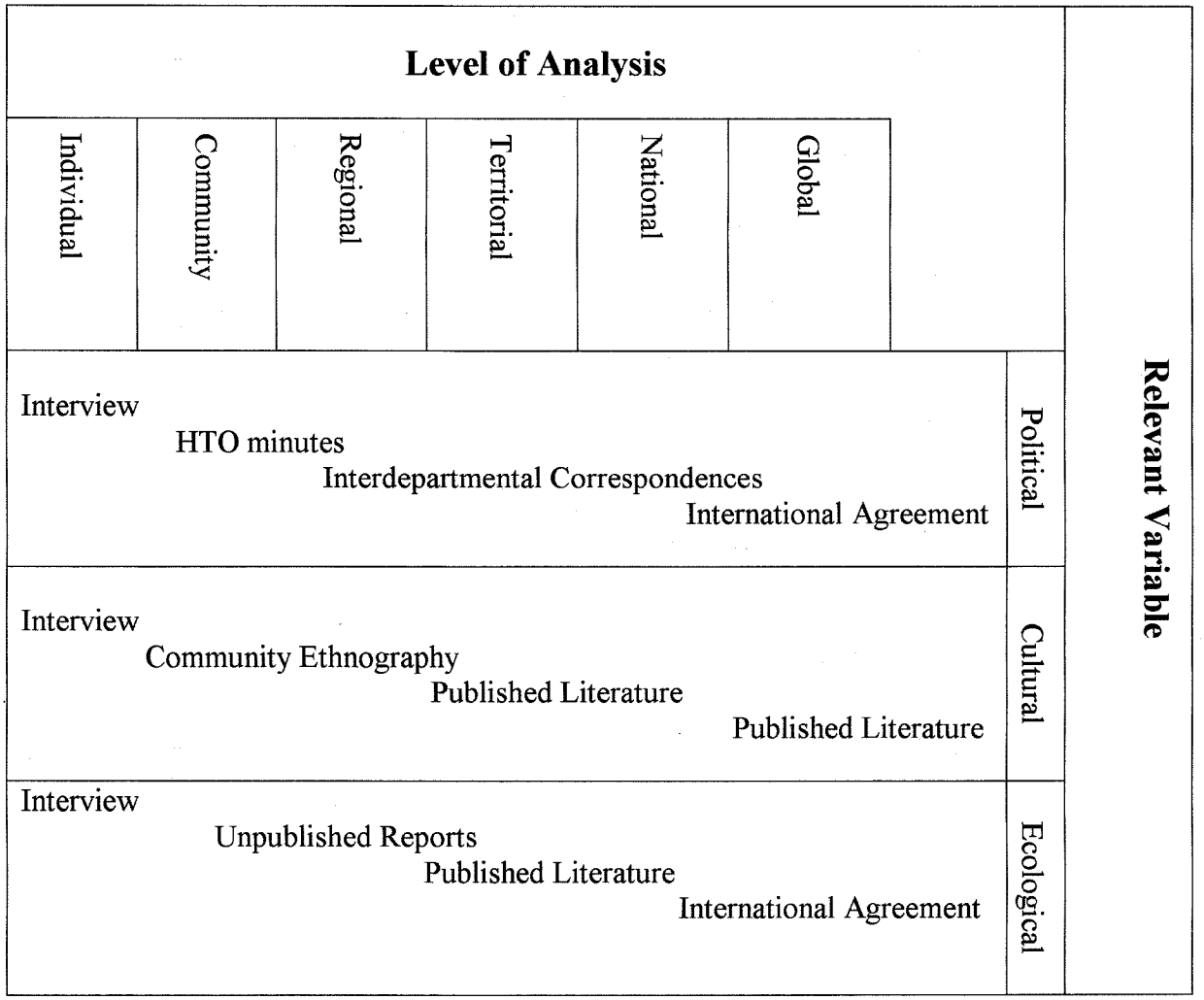

Figure 3.4: Relationship among various sources of data, levels of analysis, and relevant variables (after Stonich 1993)

This will serve to ensure that that the data gathered at each level do not serve to inform a level to which they do not belong. For example, while interdepartmental correspondence

serves as a source of data in the territorial level of analysis, it is inappropriate to use those data to understand the community or global level of analysis.

Data for the ecological variable are available in the form of unpublished reports on polar bear population inventories conducted from 1980-1985. The objective in analysing this variable is to evaluate the biological knowledge that formed a baseline of data that the management decisions were based on. Further data is available in the form of published material on polar bear biology.

Interviews, published studies, and community and regional ethnographies provide the database for analysing the cultural variable in the thesis case study. The cultural variable includes an investigation of the role that culture played in the negotiation of the 1985 MOU. This variable investigates the value of the polar bear, both culturally and economically, to Inuit. The data used to investigate the political variable include interviews, published reports, and interdepartmental correspondence. The political context had an important effect on the final terms of the 1985 MOU on polar bears. Permission to use government archival sources has been secured, and the final analysis will be reviewed by the present polar bear biologist prior to dissemination.

In summary, Figure 3.4 illustrates a systematic framework that facilitates the integration of various levels of analysis of the social and environmental variables that are relevant to the formation of the 1985 MOU on polar bears. As a methodological tool, it serves to make explicit the data set appropriate to a particular variable in the analysis.

3.7 Public Dissemination

Public dissemination of the research findings is an important part of the research process. Final copies of this thesis will be given to the Nunavut Research Institute where

it will be made available to the HTOs of both Clyde River and Broughton Island, the Arctic College at Broughton Island, the Nunavut Wildlife Management Board (NWMB), and the polar bear biologist at the Department of Renewable Resources, GNWT. In addition, I will prepare and distribute a summary report of the major research findings for the HTOs of Broughton Island and Clyde River.

CHAPTER 4

ECOLOGICAL VARIABLE

4.1 Introduction

The objective of the ecological variable of analysis is to evaluate the baseline of data upon which the management decisions were based. Figure 4.1 illustrates the variable of analysis, the source of data and the levels of analysis that are examined in this chapter.

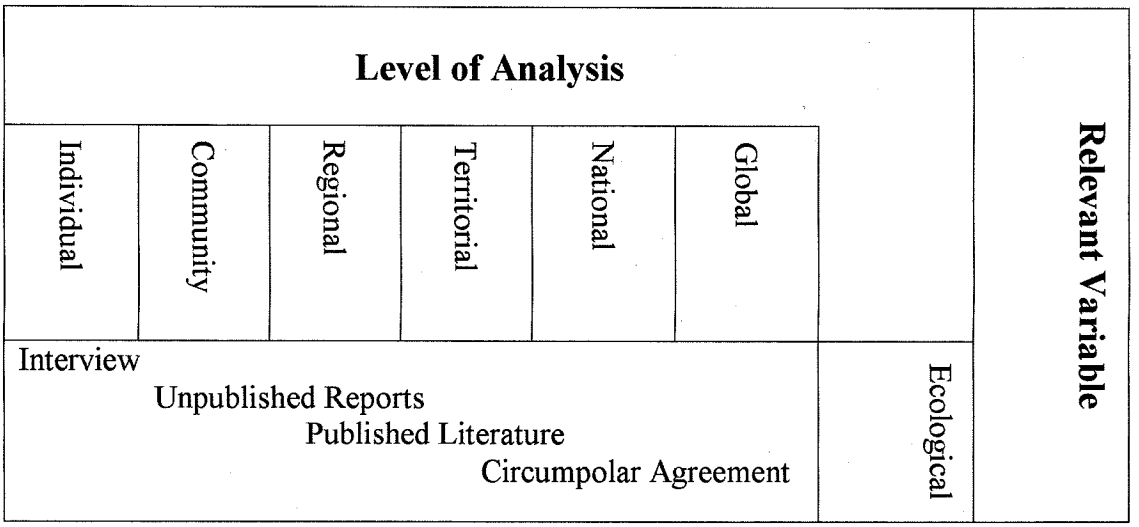

Figure 4.1: Relevant variable, data source and level of analysis to chapter 4.

The 1985 MOU on polar bears was created at the regional level. However, there are global and territorial factors that also pertain to its formation. These are summarised in the first two sections of this chapter, along with introductory material relating to the

general ecology of polar bears. The third section of this chapter describes the biological data that led to the decision to reduce the polar bear quotas for these two communities.

4.2 Global, National and Territorial Levels of Analysis

Polar bears *(Ursus maritimus)* are circumpolar in distribution and their habitat extends into the territories of Canada, Denmark (Greenland), Norway, Russia, and the United States of America (Stirling 1988). The distribution of pack ice and annual landfast ice during winter determines the southern limit of their range (DeMaster and Stirling 1981). They are not circumpolar nomads, nor do they exist as genetically isolated stocks (Taylor and Lee 1995). Land barriers and sea ice movements may explain the limited exchange between geographical areas (Taylor and Lee 1995).

Since the signing of the International Agreement on the Conservation of Polar Bears in 1973, Canada has been obligated to protect its polar bear populations from over-harvesting. Article II of the Agreement states that each signatory party "shall manage polar bear populations in accordance with sound conservation practices based on the best scientific data" (Stirling 1986). Since the signing of the international agreement, wildlife managers are required to base their decisions on sound management principles and reliable data. Moreover, the international agreement has placed Canada's management program under international scrutiny. The result of this agreement has been an increase in research conducted on the polar bear and a worldwide increase in general knowledge regarding the biology of the polar bear.

Worldwide, there are six distinct populations of bears, the centres of which are Ostrov Vrangelya, northern Alaska, the Canadian Arctic Archipelago, Greenland, Svalbard and Zemlya Frantsa-Josifa, and Central Siberia (DeMaster and Stirling 1981).

However, it is thought that at least ten discrete sub-populations exist in the Canadian Arctic archipelago (Stirling 1986), and it is now estimated that 12 discrete sub-populations exist in Canada (Taylor and Lee 1995). Taylor and Lee (1995) estimate there are approximately 12,700 polar bears in Canada and somewhere between 28,000 to 40,000 polar bears worldwide (Taylor and Lee 1995; Stirling 1990).

4.2.1 Polar Bear Ecology

The fur colour of polar bears varies from white through yellow and grey to almost brown, depending on season and light conditions. The skin, lips, and nose are black. Adult males can weigh 300 to 800 kg and measure 200 to 250 cm in length from the tip of the nose to tail. Adult females weigh 150 to 300 kg and total body length is between 180 and 200 cm. Cubs weigh around 0.6 kg at birth, but emerge from the den weighing roughly 15 kg (DeMaster and Stirling 1981).

Ringed seals (*Phoca hispida*) are the primary prey of polar bears (Smith 1980), but they may also feed on harp seals (*Pagophilus groenlandicus*), hooded seals (*Cystophora cristata*), bearded seals (*Erignathus barbatus*), scavenge on whales, or occasionally eat walrus (*Odobenus rosmarus*), beluga whales (*Delphinapterus leucas*), and small mammals, birds, eggs, and vegetation (DeMaster and Stirling 1981).

Population dynamics of polar bears vary geographically (DeMaster and Stirling 1981). Polar bears may live between 25 and 30 years (DeMaster and Stirling 1981), though Lentfer (1968) estimates that in Alaska, maximum longevity is between 20 and 25 years of age (DeMaster and Stirling 1981). In the Beaufort Sea, females become sexually mature at five years of age, while in the rest of the Canadian Arctic, females mature at the age of four (Stirling 1990). Litter sizes are small (one to three bears), and interbirthing

intervals are a minimum of two years, or a maximum of three years, depending on the timing of weaning of cubs (Ramsay and Stirling 1986). However, in Hudson Bay, females may wean their young at one year of age, allowing them to breed on alternate years (Stirling 1990). Males mature sexually at about five to six years of age (Stirling 1990). Polar bears use large and non-exclusive foraging areas (Taylor *et al.* 1985; Ramsay and Stirling 1986). Equally important, polar bears have the ability to collect and store large fat reserves from April to July when seals are most accessible (Messier *et al.* 1994). For female polar bears, fat reserves provide an essential source of energy during extended periods of denning.

Spermatogenesis takes place from February to May, and may possibly extend into June (Demaster and Stirling 1981). There appears to be intraspecific competition amongst males for access to oestrus females (Ramsay and Stirling 1986). Males suffer significant physical trauma due to this competition, with older males often sustaining severe scars and wounds on the head and shoulders (Ramsay and Stirling 1986).

Implantation is delayed in females, and gestation (conception to partuition) is therefore relatively long (Demaster and Stirling 1981). In southeastern Baffin Island, the majority of females conceive for the first time at the age of four years (Stirling 1980). Low natality rates at the age of three suggest that females have not yet conceived, and low natality rates at the age of five suggest that females are not mating since they are accompanied by a cub of the year. In contrast to the situation in the eastern Canadian Arctic, females in the western Canadian Arctic first conceive at the average age of five (Stirling *et al.* 1980). While the average natality rate in southeastern Baffin Island appears to be higher than in other parts of the Canadian Arctic, this conclusion may be

due to a sampling bias since both yearling and 2-year-old cubs were consistently undersampled (Stirling *et al.* 1980). In addition, females appeared to breed every three years, as opposed to alternate years (*Stirling et al.* 1980).

The use of maternity dens during the winter is essential to cub survival (Stirling *et al.* 1980). Furthermore, the use of dens and shelters by all members of the population may be an important way to minimise energy expenditure and reduce metabolic rate at times when access to food may be limited (Messier *et al.* 1992). Both males and females den, but females use dens for longer periods during gestation. Depending on location, females enter dens near September and exit dens from February to March (Messier *et al.* 1994). Average den tenure is between 183 and 189 days (Messier *et al.* 1994). Dens are excavated in areas where drifting snow has accumulated, and usually have one or two rooms, with features such as ventilation holes, sills, and entranceways (Harington 1968).

In the Clyde River area, polar bears excavate dens in deep drifts of snow along hillsides, the margins of fjords, and sometimes in ice fields. In the Broughton Island area, most maternity dens are located near the end of Cumberland Peninsula in areas of high relief, rugged terrain, and larger islands (Ferguson 1998). Harington (1968) refers to eastern Baffin Island as a core maternity denning area, with a concentration of maternity dens extending from Buchan Gulf to Home Bay.

4.2.2 Behaviour and Activity Patterns

Bears are primarily solitary animals, but congregate during the breeding season from April to May (Stirling *et al.* 1993). Intraspecific aggression and cannibalism may occur amongst polar bears (Swenson *et al.*1997; Taylor *et al.* 1985). In the Broughton Island region, subadults and females were seldomly observed in close proximity, while

males occasionally were found in aggregations of two to three while on land (Ferguson 1998: 33). Females with cubs of the year tend to isolate themselves from males, presumably to avoid an attack (Ferguson 1998). These results are consistent with general polar bear ecology for the Arctic. The only difference may be in the Hudson Bay region, where males tend to form larger aggregations during the summer months that are spent ashore. Polar bears do not defend territories or home ranges but move to locations where seal availability is greatest (Ramsay and Stirling 1986).

Predatory behaviour changes according to season and availability of prey. The period of abundant and available prey between April and June causes an increase in activity levels (Messier et al. 1992). From April to July inexperienced young are particularly vulnerable to polar bears (Hammill and Smith 1989). Polar bears capture seal pups, which represent the greater proportion of kills, while they are still in their birth lairs (Smith 1980). Polar bears also capture seals by sudden attacks at breathing holes, or occasionally using stalking methods (Stirling 1974).

In Auyuittuq National Park, there was a 50% decrease in activity level of bears and 30% reduction in movement while they were on land (Ferguson 1998). Females with cubs of the year were the first to leave the sea ice, usually in the first week of August. Two to three weeks later, females with one year olds and solitary adult females left for the land. The timing of returning to the pack ice from the land depends only on ice formation, and timing is not dependent on age or sex class of bears (Ferguson 1998).

Polar bear habitat use is selective, determined most often by the availability of seals. While polar bears exhibit site fidelity, they can maintain home ranges of 4,000 to 300,000 km^2, depending on season and reproductive status (Bethke *et al.* 1996). This is

because of the highly variable nature of the sea ice habitat. During the spring, polar bears most often select ice habitat with 51-75% ice coverage, and secondly habitat with 76-100% coverage. Sometimes bears select habitat with 26-50% ice coverage, and almost never habitat with 1-25% ice coverage. However, during late summer, habitat with 26-50% ice coverage was most often selected, followed by 51-75%, then 1-25% and then 76-100% was selected least frequently (Arthur *et al.* 1996).

Bears can be most often found along the floe edge and in areas of moving ice (Stirling *et al.* 1993). Only females with cubs of the year (COY) show a strong preference for stable fast ice with drifts suitable for seal birth lairs (Stirling *et al.* 1993). Since males have demonstrated intraspecific cannibalism, females may select this habitat to avoid interacting with males.

Lone females or females with two year old cubs avoid stable fast ice with drifts because seal hunting is less successful there due to the presence of snow cover. Conversely, adult males in spring may avoid stable fast ice because there is little chance of finding an oestrus female (Stirling *et al.* 1993). The distribution of males during the breeding season is determined more by available females than by resource availability. Conversely, the distribution of females is determined first by the availability of resources and secondly by the presence of breeding males (Stirling *et al.* 1993). While on land, polar bears do not compete for mates or food, and this time is primarily a resting period (Ferguson 1998).

4.3 Regional Level of Analysis

Having described some of the general characteristics of polar bears in the preceding section, the next section will be specifically concerned with presenting the unpublished data on the polar bear population inventories that led to the decision to reduce the quotas for the communities of Broughton Island and Clyde River. A brief description of the study area will be given, followed by a detailed presentation and analysis of the polar bear population inventories conducted by the Department of Renewable Resources (GNWT) between 1980 and 1985.

4.3.1 Methods

Polar bears were captured from a helicopter using remote injection equipment (Lee and Schweinsburg 1982a). Standard techniques of polar bear capture and handling were used throughout the survey (Lentfer 1968). Once bears were immobilised, they were marked with individually numbered ear tags and were tattooed on the insides of both upper lips with a corresponding number (Lee and Schweinsburg 1982a). Weight, sex, total length, chest girth and physical and reproductive condition were recorded for each bear (Lee and Schweinsburg1982a). Also, the first premolar was pulled for age determination, and each bear was painted with a number for subsequent identification from the air.

Over the period from 1980-1985 polar bear captures took place on the shorefast ice in the spring (April – May), prior to sea ice break-up (Lee and Schweinsburg 1982a). The active pack ice was not searched due to difficulties in tracking bears and fuel limitations in helicopter range (Lee and Schweinsburg 1982a). Figure 4.2 shows the study area examined throughout the five years of survey research.

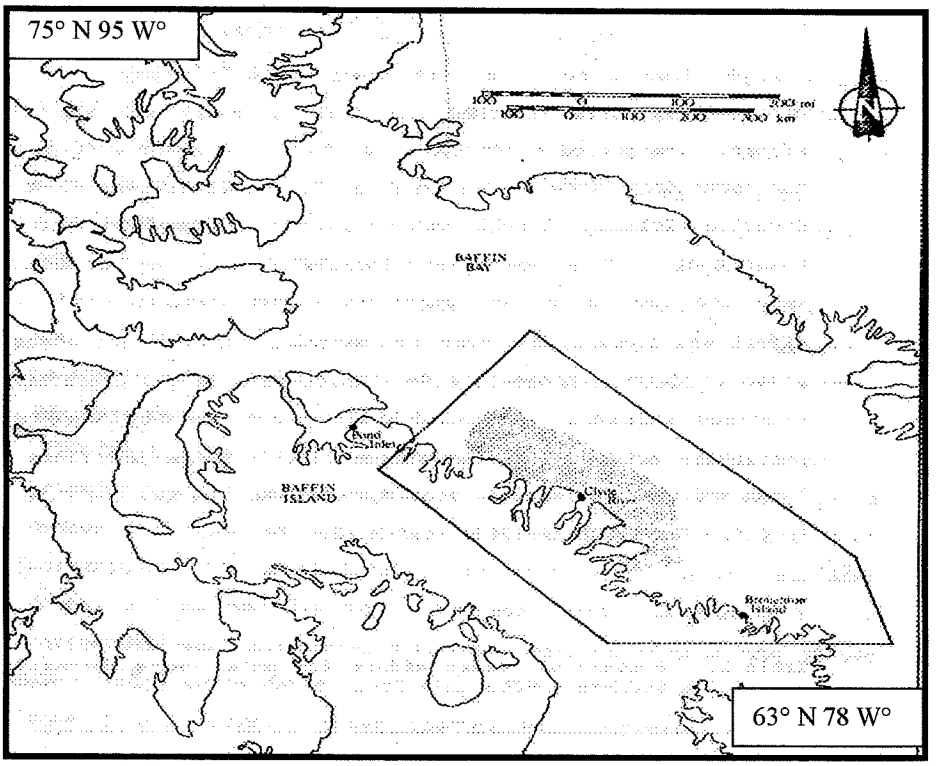

Figure 4.2: Study area and area searched by helicopter for polar bears (shaded) by helicopter from 1981-1984 (from Schweinsburg and Lee 1982a)

In the fall of 1980, a short exploratory tagging program was conducted near Clyde River (Lee 1982) and the next year, in 1981, a more extensive survey program was underway. A total of 117 hours were flown in 1981 (Lee 1982). The total hours were divided between areas north and south of Clyde River from 08 April to 12 May 1981, while 13 May to 28 May was spent around Broughton Island. A total of 65 bears was captured and marked during 1981. Bears were located by tracking, as densities were to too low to use visual scanning (Lee 1982).

During the second year of the mark/recapture study, fewer hours were flown due to bad weather and mechanical problems with the helicopter. Between 13 and 14 April 1982, a total of 46.2 hours was flown, and 17 bears were captured and marked. In the

third year of the study, from 6 April to 18 May 1983, a total of 47 bears were captured and marked. It is not known how many hours were flown during the 1983 field season. During the 1984 field season, a total of 112 hours were flown from 6 April to 18 May. A total of 60 polar bears were marked and released (Lee and Schweinsburg 1985). Tables 4.1 and 4.2 summarise the total number of hours flown, the number of bears captured, and capture effort.

Table 4.1: Hours flown per study year and total number of bears captured (compiled from Lee and Schweinsburg 1982-1984)

Year	Total hours flown	Total bears captured
1981	117	66
1982	46.2	17
1983	Unknown	47
1984	122	61

Table 4.2: Capture effort in hours/encounter for Northeast Baffin Island from 1981-1985 (from Department of Renewable Resources 1985b)

Year	Clyde - Cape Hunter	Clyde - Cape Henry Kater	Cape Henry Kater - Broughton
1981	2.88	3.20	1.58
1982	2.81	5.23	0
1983	3.59	3.48	3.18
1984	2.62	1.96	2.5

In April 1985, 17 VHF radio transmitter collars were placed on female polar bears along the northeastern coastline of Baffin Island. Aerial surveys to relocate these radio-collared bears were flown in April and September of 1986 (Taylor, pers. comm.). Seven of the 17 radios deployed in 1985 were relocated during the 1986 aerial survey (Taylor pers. comm.). Three out of these 7 bears were located outside areas usually searched by tagging operations (Taylor pers. comm.). Between 1980 and 1990, bears that were marked in the Baffin Bay population were harvested in Greenland (Taylor pers. comm.). The telemetry results documented long distance movements outside of the Northeast Baffin management zone. It is thought that bears den along the north-eastern coastline of Baffin island, and spend much of the spring and summer hunting on the coast of Greenland (Taylor pers. comm.).

The results of the telemetry survey indicate that there is exchange of polar bears between Northeast Baffin Island and the western coast of Greenland. It is apparent that the boundaries of the Baffin Bay population were not restricted to the 1980-1985 study area that was searched. However, this information was not incorporated into the 1985 population estimates since the results from the telemetry surveys were not available until after 1985.

4.3.2 Results

The primary method of gathering the mark information in the 1980-1985 survey period was through hunters returning tags from bears that were taken from the Baffin Bay population. A summary of the tag return information is included in Table 4.3.

Table 4.3: Summary of marked bears in hunter kill on northeast Baffin Island 1979/80 - 1984-85 (Department of Renewable Resources 1985b)

Season	Number of bears in quota	Number of bears marked	Marked bears in kill	Bears marked outside study area in kill	Bears marked inside study area shot before mixing [1]	Bears marked inside study area in kill
81/82	74	66	11	3	0	8
82/83	75	17	13	2	1	10
83/84	70	47	10	0	0	10
84/85	58	61	20	3	1	16
Total	277	191	54	8	2	44

[1] The term 'mixing' refers to an individual polar bear circulating in the bear population after it has been marked.

The mark/recapture technique that was used to estimate the abundance of the Northeast Baffin Island polar bear population relies not only on the marking of individuals within the population, but also on the recapture of those marked individuals. Thus, a population estimate is fundamentally derived from analysing the proportion of marked to unmarked individuals. The mark/recapture technique is suitable for populations that are difficult to sight and for populations where individuals do not concentrate at any time. This technique has the primary advantage of providing information concerning movements, rates of growth, reproduction, and survival rates (Demaster *et al.* 1980). In order to apply the Demaster *et al.* (1980) population estimate model, the following assumptions are necessary: 1) the estimated annual survival rate, and its variance, are constant throughout the study, and are the same for marked and

unmarked bears, and are known; 2) marked and unmarked bears have the same probability of capture; 3) marked bears do not lose their marks and all marks are reported on recovery; and 4) all samples are instantaneous; mortality should be negligible for the period of the study.

This technique has the advantage of allowing for an estimate of an open population (one where there is emigration or immigration) by using estimates of survival rates. The survival rate is estimated from age structure and calculation of the survival rate assumes the following: that the growth rate of the population is incorporated into the survival rate, the survival rate is constant, and the age structure of the population is stationary (DeMaster *et al.* 1980).

The mark/recapture technique assumes that individuals are randomly distributed within the population boundaries. In order to test this assumption, the mean distance between initial capture and recapture location was determined. The mean distance observed between animals marked and subsequently recaptured was significantly different from the mean distance expected if all possible recaptures were equally likely for all years, indicating a tendency for marked animals to be killed or recaptured near the place they were initially marked (Taylor pers. comm.). One complication in meeting this assumption is that between the time that a polar bear was marked and again recaptured, it could have migrated in and out of the study area. Also, polar bears with spring home ranges located mainly offshore are less likely to be recaptured than polar bears with home ranges within the study area. The seasonal home ranges of polar bears vary amongst individuals (Taylor pers comm.), thus, it is possible that polar bears were not distributed randomly within the study area.

The final estimates of the Northeast Baffin Island polar bear population on which the administrative staff of GNWT based their recommendations are summarised in an internal report delivered to the Deputy Minister of Renewable Resources (Department of Renewable Resources 1985c). The report stated that the population estimate from mark returns was 609 +/- 272 (340-880). The survival rates from age structure (including all mortality) were estimated to be approximately 86%, which was low enough to cause biologists to be concerned that the population was threatened. They found that the breeding parameters were not typical - almost twice other areas at 0.5 - 0.7 cubs/female/year, as compared to 0.3-0.4. cubs/female/year in other areas of the Canadian Arctic. They found that the age structure was weighted to young animals, which sometimes indicates a stressed population. The percentage of marked bears that were recovered in the kill was higher than expected, indicating the number of bears in the population was fewer than they expected to find. Lastly, the document pointed out that the sex ratio of the kill was decreasing (M/F) (more females are being taken), and the mean age of adult females is decreasing.

4.3.3 Discussion

A significant limitation on the reliable estimate of polar bear numbers in the northeast Baffin Region was that the degree of exchange between Baffin Island and Greenland was unknown. If there is a high degree of exchange between Baffin Island and Greenland, then bears that were marked during the Baffin Island study could have migrated to the Greenland area, which could have resulted in population estimates that were too high. A further limitation to the reliability of the mark/recapture efforts was that the kill and capture effort was restricted to the areas nearshore, thus both kill and capture

effort is non-random. Also, bears that were initially captured are likely to have home ranges near the area that is accessible to hunters, thus skewing the number of marked bears that were recorded in the harvest. This would have skewed the marked to unmarked ratio of bears upwards, leading to an underestimate of the population.

The search effort in 1982 was unusually limited due to poor weather conditions. Since the DeMaster *et al.* (1980) technique is dependent upon the results of the year before, the poor tagging results of 1983 could have caused the estimates of 1984 and 1985 to be skewed. Also, mark efforts (hours flown / bear) were not equal every year, thus the results from year to year cannot be compared with any reliability. Population estimates may reflect the irregularity of tagging efforts rather than actual fluctuations in the polar bear population.

The management action taken in 1985 was the result of population estimates of the Baffin Bay population ranging from 300 to 600 bears (Lloyd 1986). This management action may not have had the logical outcome of allowing the population to increase. If the population were in decline, then the only way to allow that population to recover would be to call a moratorium on the taking of bears. While the technique of maximum sustainable yield could allow for the calculation of a harvest from a population that is in decline, this is a highly technical and controversial technique (Larkin 1977).

4.4 Community and Individual Level of Analysis

The community and individual levels of analysis include the observations of local hunters on the ecology of the polar bear. It is beyond the scope of this thesis to conduct a comprehensive survey of the traditional knowledge of the polar bear. Figure 4.3 illustrates the seasonal pattern of local polar bear harvesting activities. In the Clyde

River area, the portion of the Baffin Island Coast from Clyde Inlet north to Cape Hunter (see Apendix A for the locations of these place names) contains a larger number of bears both on the sea ice and also denning inland (Wenzel 1981). For the Clyde Inuit, the leads between Cape Christian and Black Bluff and the narrow strip of land that separates the outer coast from Inugsuin Fjord are important areas for polar bear harvesting. In late winter, when most bears have dispersed over the sea ice and left the land, the rough ice between Capes Hunter and Adair is hunted heavily (Wenzel 1981). South of Clyde River, near Broughton Island, the highest density of polar bears occurs between Angijak Island and Cape Dyer (Stirling *et al.* 1980).

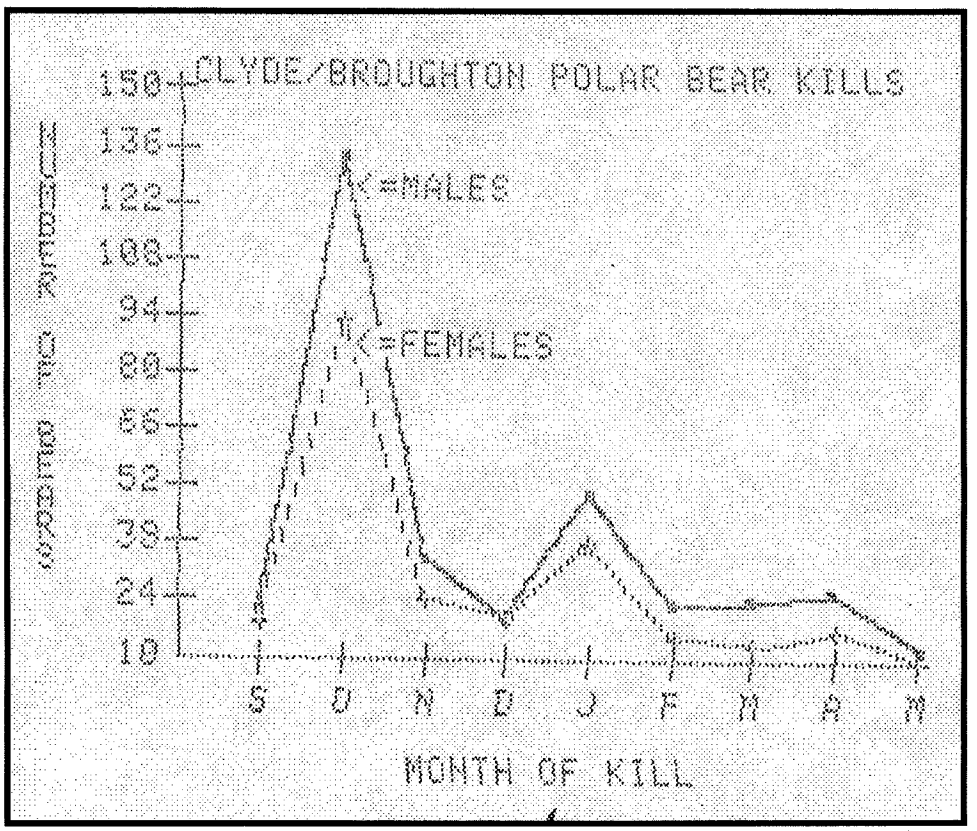

Figure 4.3: Number of bears harvested (summarised from 1980-1985 polar bear population surveys) according to month of year (Department of Renewable Resources, 1985).

The majority of polar bears are harvested in September and October, when the bears are coming near the shore as the sea ice forms. Bears are most accessible to hunters during this time, which explains the large range in the graph.

4.5 Summary

In summary, the mark/recapture method was used to estimate the abundance of the Northeast Baffin polar bear population. While radio collars were employed in 1985 in order to better understand polar bear movement patterns, the results from the telemetry surveys were not available to incorporate into the estimate of population abundance that was used to recommend a sustainable reduction in the quotas for Clyde River and Broughton Island in 1985. Since the degree of exchange between the west coast of Greenland and the east coast of Baffin Island was unknown, there was significant limitation on the reliability of the polar bear population estimates. The primary difficulties in conducting the mark/recapture population surveys is that the Baffin Bay population boundaries were not well understood, and it was therefore impossible to distinguish population fluctuations from natural causes of mortality (harvest and death), and immigration or emigration.

CHAPTER 5

POLITICAL VARIABLE

5.1 Introduction

The objective of this chapter is to document political activity relevant to the formation of the 1985 MOU on polar bears. Figure 5.1 illustrates the relevant variable of analysis, data sources, and level of analysis to be investigated in this chapter.

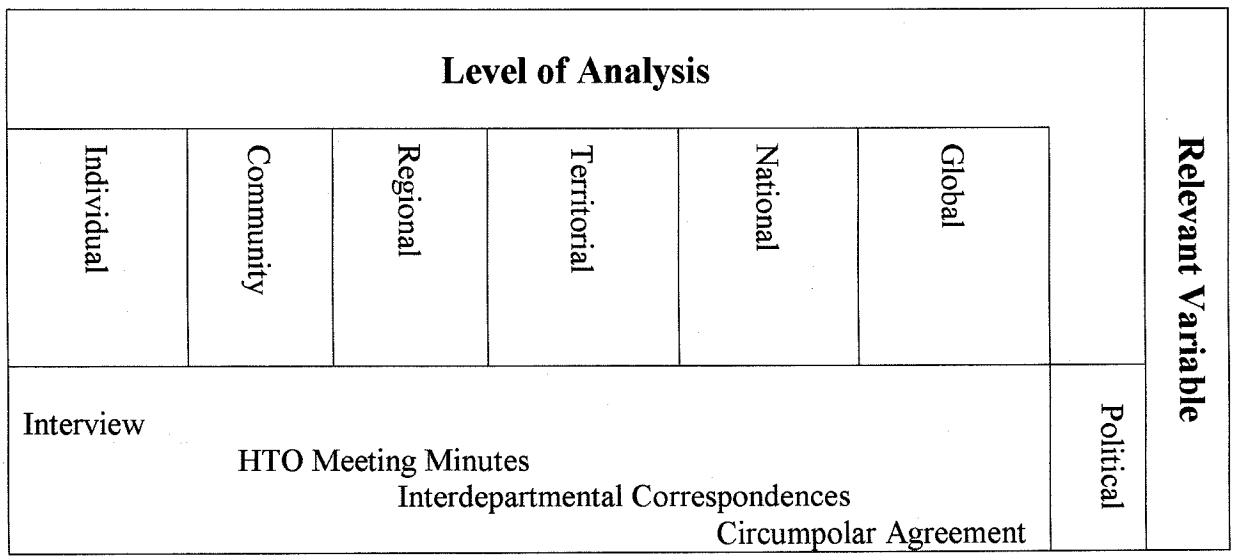

Figure 5.1: Relevant variable, data source, and levels of analysis to chapter 5.

5.2 Global Level of Analysis

The International Agreement on the Conservation of Polar bears is politically relevant to the formation of the 1985 MOU on polar bears on the global scale. Prompted by international concern that the circumpolar population of polar bears may be at risk of declining, the countries of Canada, Denmark (Greenland), Norway, Russia and the United States of America signed an international agreement in 1973 (Fikkan *et al.* 1993; Freeman 1996; Lentfer 1973). Article II of the International Agreement states that "each signatory party shall manage polar bear populations in accordance with sound conservation practices based on the best available scientific data" (Stirling 1986), thus placing Canada's management program under international scrutiny. Canada's obligation to comply with the terms of the International Agreement has played an important role in the allocation of funding for research programs and also in the development of local agreements that are designed to comply with the conservation goals as outlined in the International Agreement.

The success of the International Agreement lies in the fact that while the agreement calls for a general ban on the taking of polar bears, it does allow harvest "wherever polar bears have or might have been subject to taking by traditional means by [each country's] nationals" (Article III [i][e] in Fikkan *et al.* 1993). Canada's interpretation of the term 'traditional rights of local people' permits the local polar bear harvest to continue (Fikkan *et al.* 1993). Thus, the International Agreement does not affect the sovereign rights of nations to form appropriate legislation for the conservation of polar bears (Freeman 1996).

5.3 National Level of Analysis

The harvest of polar bears was not regulated in Canada until 1968 when quotas were established for all communities that hunted bears (Stirling 1986). Stirling (1986) explains, "In the absence of polar bear population data, the mean of the previous three years' harvest was calculated separately for each settlement, and a slightly lower value was set as a quota for each settlement" (Stirling 1986: 169). Fur sale records were used to calculate the mean harvest (Stirling *et al.* 1980). Since "it was not known how the total harvest related to the number of polar bears in the area" (Stirling *et al.* 1980: 3), "Inuit hunters were told that this was an interim measure and that quotas could be changed up or down when results from population studies were eventually made known" (Stirling 1986: 169).

Polar bear harvesting is an integral component of the northern economy. The subsistence economy relies on cash income in order to meet the increasing cost of purchasing supplies to conduct the hunt (this includes transportation, ammunition, and other supplies) (Wenzel 1991). The economic impact of the 1985 polar bear management agreement on Clyde River and Broughton Island was exaggerated by the fact that it was negotiated on the heels of the crash in the sealskin market. The 1983 European boycott on sealskins, renewed in 1985, had an immediate economic effect on Inuit communities; "they very quickly lost control over their local village communities"(Wenzel 1991: 123).

By the mid-1970s Inuit hunters were no longer able to rely on the sale of polar bear skins as a source of income. The first reason for this was that the price for polar bear skins had declined significantly (by half to $500) (Wenzel 1991). The second reason was that by 1975 the number of hunters eligible to harvest polar bears had swelled

beyond the available quota of 45. Thus, an increasing number of Inuit could no longer rely on the polar bear hunt as a source of income.

Polar bears are important to Inuit for both cultural and economic reasons. Taylor and Lee (1995) estimate that the polar bear fur harvest brings between $500,000 to $600,000 (Canadian dollars) per year into Arctic communities, while outfitting and guiding sport hunts may bring another $660,000 (Taylor and Lee 1995). In the communities where the meat is consumed, a conservative replacement cost would be about $150,000, and guiding for tourism brings another $200,000 per year to communities. This income ads up to an estimated range of $1,410,000 to $1,510,000 in income per year for Arctic communities (Taylor and Lee 1995).

5.4 Territorial Level of Analysis

Before proceeding to describe the negotiation of the 1985 MOU, it is helpful to have an idea of the relative political positions of the individuals that were involved in the agreement. The Deputy Minister of Renewable Resources was ultimately responsible for approving the Northeast Baffin Management plan. The Assistant Deputy Minister fell under the authority of the Deputy Minister. The Department of Renewable Resources fell under the jurisdiction of the Deputy and Assistant Ministers. The Chief was the head of the Department of Renewable Resources, looking over the Supervisor of Renewable Resources, with the polar bear biologist being the last in a long chain of command that ultimately had to answer to the Deputy Minister of the NWT. At the territorial level, the Chief and Supervisor made recommendations to the polar bear biologist, who also served as an intermediary between the local hunters and the territorial government.

In 1983, the supervisor of Renewable Resources reviewed the preliminary results of the first three years of population inventories conducted by the polar bear biologist. Kevin Lloyd, the Supervisor of Renewable Resources, convinced that there existed a real possibility of over-harvest of polar bears in the Northeast Baffin region, recommended that "the quota of 67 bears for Broughton Island and Clyde River not be changed for the 1983 season but that the upcoming community meetings discuss the possibility of some reduction of quota in 1984" (Lloyd to Chief of Wildlife Management June 9, 1983).

This correspondence indicates that the Supervisor was recommending a management strategy that reduced the quotas for the communities before the Northeast Baffin population survey was completed. This correspondence also illustrates the structure of the decision making chain. Recommendations were made at the territorial level of government, and then carried out by a regional representative who served as an intermediary between the HTOs and GNWT.

5.5 Regional Level of Analysis

Having directed the population studies and the major management actions to be taken, the Territorial government turned the responsibility for negotiating the final terms of the agreement, within specified parameters, over to the community level. The first meeting with the communities to discuss the possibility of a reduction in quotas took place in Broughton Island in 1983. The meeting began with the polar bear biologist reviewing the preliminary study findings after two years of field survey. According to the polar bear biologist's meeting notes, the following points were discussed: 1) a large number of marked bears were showing up in the kill; 2) the estimate for the population was 660 bears (with large standard errors); 3) there appears to be a large number of

immigrant of bears marked outside the study area; 4) it is difficult to find bears to capture; 5) large number of cubs in the kill but a lack of cubs in capture (Schweinsburg to Deputy Minister July 11, 1983).

Following the presentation of these survey findings, the meeting went on to discuss various points. The polar bear biologist recorded that Broughton Island was willing to reduce its quotas immediately but Clyde River delegates would only consider quota reductions after studies were completed (Schweinsburg to Deputy Minister, 1983).

At this point in the negotiations a significant difference in the two communities attitudes' surfaced. First of all, Clyde River had a great deal more to lose from a quota reduction than Broughton Island. The Clyde River quota of 45 was significantly higher than the Broughton Island quota, which was 22. A reduction of half for Clyde River would have meant the loss of over 20 tags, but for Broughton Island a similar reduction would have meant the loss of 11 tags. The polar bear biologist records, "Broughton was very aware of the danger of outside interference and wanted to show the world that they are responsible by taking the initiative" (Schweinsburg to Deputy Minister, 1983).

In the same meeting, one of the representatives from Broughton Island expressed the opinion that Clyde River's quota should be reduced by half. The same representative said that if the quota was not reduced, a boundary should be drawn between the two communities "so that they will not share blame for poor polar bear management" (Schweinsburg to Deputy Minister, 1983). The polar bear biologist recorded that he "emphasised that it was one population and drawing a boundary would not solve the problem"(Schweinsburg to Deputy Minister, 1983). While the possibility of a hunting boundary did not make ecological sense since bears wandered freely over the coast of

northeast Baffin Island, the hunting boundary made political sense to the hunters of Broughton Island since it would have defined accountability. This strategic manoeuvre would have relieved them of being held responsible if there were a decline in the population.

5.6 Community Level of Analysis

In the last section we saw that the regional level of political analysis involved the establishment of the structure and general guidelines for the MOU, whereby the details were left up to the local community organisations, within the guidelines established by the GNWT. The community level of analysis relates to the details of the agreement that were worked out between the local hunters and representatives of the territorial government.

The first meeting between the communities and GNWT to discuss the possibility of a quota reduction was held on 18 July 1984. The meeting was attended by the president and three board members of the Broughton Island HTO, the president and seven other board members of the Clyde River HTO, the polar bear biologist, and the game officers from both communities (Schweinsburg to Lloyd, 11 September 1984). The polar bear biologist says, "I made it clear that we wanted a consensus and an Agreement in Principle that we had a problem that should be mutually resolved between the two [HTOs] and ourselves"(Schweinsburg to Lloyd, 11 September 1984). Many community members were reluctant to agree that the northeast Baffin population of polar bears was in decline. The biologist reported:

> After considerable discussion, and several members reserving judgement as to whether we had a problem or how severe it may be, they finally agreed in principle that things looked serious enough that we should have another meeting

> to discuss concrete solutions to the problem (Schweinsburg to Lloyd, 11 September 1984).

One of the major points brought forward at the 1984 meeting was the possibility of establishing a hunting boundary between Clyde River and Broughton Island, in fact, it was one of the major points of contention between the two communities. The polar bear biologist explains that Broughton Island's requirement that a hunting boundary be drawn

> arose out of Broughton's perception that there is a serious problem with polar bear populations and they did not want to share the blame for an overhunted population. They thought a boundary would exempt them from blame or at least put them at more of a distance from the more recalcitrant Clyde position. They also had a perception that the larger quota at Clyde was mostly to blame for the problem. The two [HTOs] could not resolve this point since Clyde adamantly did not want a boundary. (Schweinsburg to Lloyd, 11 September 1984)

After this first meeting in 1984 it was obvious that another meeting would be necessary before any concrete resolutions were made concerning the creation of a polar bear management agreement (Schweinsburg to Lloyd, 11 September 1984). The polar bear biologist agreed to continue the study for another year, because, "not only do I want to lessen the chance of making a mistake, but also the hunters would feel better if our evidence of over-hunting was more concrete (Schweinsburg to Lloyd, 11 September 1984). The polar bear biologist also noted that the "Department of Renewable Resources will ensure that an economic hardship will not occur" (Schweinsburg to Lloyd, 11 September 1984).

The Department of Renewable Resources developed a compensation package designed to provide economic recompense if the communities agreed to reduce their quotas. GNWT offered the communities $1,000 to be paid to the HTO per year for each

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> quota for Broughton Island so there should be some kind of agreement between the two communities. That's why we had the meeting two or three times (Interview BA, 1998).

The boundary issue appears to relate to the jurisdiction of the HTOs and their responsibilities for the status of the resources. Eventually a boundary was set at Home Bay, located between the two settlements (BA Interview 1998, LK Interview 1997; Interview MA 1997, Interview EK 1998). The agreement over the boundary is not mentioned formally in the 1985 Northeast Baffin Agreement, nor is it officially enforced (Management agreement 1985; Interview LK1997; Interview BA 1998). However, members of the both the Clyde River and Broughton Island HTOs are aware of the presence of a boundary.

A second concern expressed at the negotiation meetings was whether there was truly a decline in the polar bear population. When hunters were asked if they agreed that the polar bear population was in decline, a number of answers were received. Many hunters expressed reserve when commenting on the possibility of decline the population. One hunter said, "We didn't know. At that time, maybe the populations were moving. [Between now and then] maybe they were in another area but now they are coming back to this area" (Interview LK 1997).

Hunters from Clyde River were more hesitant to agree that the population was in decline. The Clyde River hunters presented testimony from the community elders that the population was not in fact in decline (Interview BA 1998). In an interview statement: "I think that that was the difference between Clyde River and Broughton Island, in the meetings they [Clyde River] kept bringing up the knowledge of the elders"(Interview BA

1998). The members of the HTOs were put in a difficult position in that they were being required to choose between the conflicting accounts of the elders and of the GNWT.

According to interview information, one of the main factors that influenced the decision to come to an agreement was the offering of compensation funding. Interview sources unanimously reported that the economic compensation package was an important factor in their decision to reduce quotas (Interview LK 1997; Interview MA 1997, Interview EK 1998, Interview BA 1998, Interview LI 1997).

The second important factor that influenced the finalisation of the 1985 MOU on polar bears was the understanding that the agreement would last for a limited time, and then quotas would return to their historic level. Interview sources in both Broughton Island and Clyde River said that they were willing to reduce quotas for five years, and that when the polar bear population had had time to recover the quotas would return to their original level (Interview LK 1997; Interview MA 1998; Interview BA 1998). One source said "we agreed for six years only, to see how the population changed"(Interview LK 1997). Another hunter said, "We thought we were going to get our quotas back, but the promise didn't come through as they said – they didn't give us our quotas back"(Interview MA 1997).

The agreement itself includes no concrete phrasing that indicates the quotas would be returned to their original level, only that,

> The Minister and the Association shall conduct a complete review of the polar bear status including such economic, environmental and wildlife management considerations as are relevant, upon the expiration of five complete years from the commencement of this agreement"(Article 6, Memorandum of Understanding on Polar Bears 1985).

The final draft of the 1985 MOU on polar bears was approved and signed by both the Clyde River and Broughton Island HTOs and GNWT in July of 1985 (Memorandum of Understanding 1985). Studies concerning the status of the Baffin Bay population were to continue for years to come. In 1991, upon the expiration of the 1985 MOU on polar bears, the quotas for the two communities were re-evaluated based on new survey information. Minor upwards adjustments were made for both communities, with the quota from Clyde River changing from 15 to 20, and the quota for Broughton Island changing from 10 to 20 (Memorandum of Understanding 1991). The upward adjustment meant that the quotas for Broughton Island were returned to their original level, but that the quotas for Clyde River remained at half their historic value.

5.7 Individual Level of Analysis

Within the regional negotiation process, individual opinions were an important driving force behind the formation of the MOU on polar bears. This section (for which the primary data source is the interview) explores the political process in the formation of the 1985 MOU on polar bears at the individual level. It is included in this analysis as an opportunity to explore other factors relevant to this thesis that may not have been expressed formally in the final terms of the management agreement.

From the standpoint of the biologist, concern was expressed over the role of economic compensation. The polar bear biologist did not question the necessity and importance of economic compensation, but did express concern about offering compensation as setting a precedent in wildlife management techniques. The polar bear biologist says, "The primary motivation for setting quotas and other management actions...should be conservation (Taylor and Lee 1995)". While it is agreed that there is

a need for "government to share the risk [of economic loss] as part of the management prescription for this population, the question of sustainable quota levels is not an economic one, but a biological one"(Taylor and Lee 1995).

From the standpoint of the community members, different perspectives are apparent. Some expressed the sentiment that the compensation monies were not adequate replacement for the loss of a tag, since a polar bear hunt represents much more than simply a monetary sum (Interview LI 1997). Other hunters expressed a concern that the existing deterrent programs were not sufficient, since the reduction in quota increased the risk of bears entering the village, thereby posing a greater risk to both life and property.

"Northerners have been living in this country for thousands of years, so have the polar bear. Question has come to the minds of some people in the north now and again who the intruder is, the man or the bear when a man-bear encounter takes place"(Iqaarialu 1986). Iqaarialu (1986) also states:

> Before skidoo came into existence, a bear comes across a dog team tracks or human tracks, the bear would retreat from the tracks to avoid danger (man and dogs). Because camps were scattered on the Arctic and with dogs in every camp, bear intrusion into camps was less frequent. Bears being used to the noises that nature made (wind howling, cracking sounds of ice, ocean waves and etc.) before the foreign noises were in existence, barking of dogs was feared by polar bears. Barking of dogs was probably known by bears to have links with dangers such as a team of dogs and man attacking them.
>
> A hunter who kills a bear in summer time in those days would not only use the bear meat for food but also probably save seal meat caches. The bear a hunter kills was a potential destroyer of seal meat caches, therefore, he saves meat caches which he can use later and uses the bear meat for food"(Iqaqrialu 1986).

Since the establishment of the quotas, community members are not able to kill problem bears that pose a threat to their safety.

> When hunters go out with their family, even if they are bothered by polar bears, we're trying hard not to kill unless we have to – even if they are eating or destroying their property, they're trying hard not kill them unless they can't help

> it, like for life. Polar bears are not friendly, they are not trained by people, they are a danger"(Interview MA, 1997).

In 1986, the president of the Clyde River HTO prepared a paper describing aspects of nuisance bears and the need for compensation of lost property. He requested that the Member of the Legislative Assemble (MLA) present these concerns to the Territorial Legislative Assembly. He wrote,

> There should be some form of compensation paid to hunters for properties destroyed by polar bears. This includes meat caches. We realised that the legislation has been placed to protect bears for the benefit of northerners, so there will always be bears for Northerners to hunt for generations to come without hurting the polar bear population. The Legislation protecting bears in meaningful and wise in a long run but the protected animals (polar bears) are destroying personal properties and meat caches of those whom the bears are protected for, therefore, we are asking the Government of the Northwest Territories to come up with a program that will compensate individuals' personal properties and meat caches when destroyed by polar bears"(Iqaqrialu 1986).

The hunters of the communities of Clyde River consider destruction of property by polar bears a significant problem. Due to the large number of bears that wander through the community, many hunters often find that some of their belongings have been destroyed by polar bears. The hunters expressed the sentiment that if they were being required to reduce their quotas for polar bears, then GNWT should reimburse them for property that was destroyed by polar bears.

A second concern expressed at the individual level was the understanding that the quotas would be returned to their original level (45 for Clyde River) in 1991. While there is no mention of this in the final terms of the agreement, hunters in Clyde River expressed the understanding that the GNWT agreed to return quotas to their original level after the population had had time to recover. The fact that quotas did not return to their original level in 1991 (the quotas were adjusted upwards to 20 for Clyde River and 20 for

Broughton Island), was a source of significant discontent with the management program. The former chair of the Clyde River HTO explained,

> From 1985 to 1996, with the HTO and the Renewable Resources officer, we were really working pretty hard, trying to protect our quotas. In the community, even if there are polar bears in the middle of houses we would try not to kill them unless we are in danger. That agreement made me so mad, that I couldn't stay with the HTO anymore so I stepped down. I thought that promise, agreement is agreement, but at the end, they changed. These people were trying to protect the community. They were in danger, giving their life to the polar bear, trying to protect the quotas of the community. They were patrolling the community, even in the dark, even in storm. That makes me so angry, trying to follow the agreement, that I decided to step down from the HTO"(Interview MA 1997).

A third area of concern expressed by the hunters was that not all community members were convinced the northeast Baffin Island population of polar bears was in decline. In fact, community members were requesting an increase in quotas in 1981. In a tabled document presented at the NWT legislature, a representative of the northeast Baffin Island communities requested an increase in quotas.

> I have three questions for the Minister of Renewable Resources. The three questions which I was told to ask you are all related to one another, all are topics on polar bears. The people of my constituency tell me that there is a limited number of polar bear quotas, the people are not employed and the younger people are asking for a polar bear quota increase. The quotas that we do get are not enough in Pangnirtung. The people of Clyde River and Broughton Island are also asking for an increase of quotas. I think that the people know for a fact that there are an increase of polar bears too. I would like to know if the Minister is going to look into this matter of increasing polar bear qoutas in these communities" (Question 55-81(1), February 13, 1981).

In addition, Clyde River elders presented testimony that the polar bear population was not in decline at the second negotiation meeting held in Clyde River. Record of the testimony presented by the elders was not recorded in GNWT notes. It appears that GNWT officials did not consider the testimony of the elders in great depth.

One of the positive aspects to emerge from the negotiations was the willingness of all parties concerned to negotiate a final agreement between the communities. Some hunters expressed satisfaction over the final resolution of difficult issues. One hunter in Broughton Island noted his satisfaction with the responsible way that Broughton Island hunters handled the greater control over their polar bear management program. He explained,

Q. Why did GNWT come to negotiate, whereas before it had always imposed quotas?
R. Well, it was more like control from the outside. Every time they did a survey, they
had more control and they made their own decisions. But, these meetings were a big step for us because they were willing to let us do it and negotiate it ourselves, and that way we had more solid ground, and they can't say, when things are not going right, we agreed between this community and that community. And that makes sense – big, big sense. And I think that in the long run it is a whole lot better than being controlled from the outside.
Q. How would you describe the general attitude, amongst hunters?
R. You mean the meetings?
Q. Yes.
R. (smiles) It was not so good at times. It was better in a way, until they start to understand. There was some real division regarding the situation. But we had to have understanding at the same time.
Q. What was the feeling after the meeting?
R. Good. We felt good because we already agreed through the [HTO] board of directors. We had already agreed about the position we were in before we went to Clyde River, and it was a good common ground. And the people knew that once we started negotiating with Clyde River, we were all on good ground. Afterwards – it was a long meeting – people understood.
(From Interview BA, Broughton Island 1998)

5.8 Summary

At the global level, the International Agreement on the Conservation of Polar Bears requires that Canada demonstrate to the international community that it has a sound

and effective management strategy. Canada regulates polar bear hunting by aboriginal residents of the North through a quota system that is based on estimates of the abundance of the polar bear population. The recommendations for the general structure and terms of the 1985 MOU on polar bears for Clyde River and Broughton Island were made at the territorial level. At the regional level, the polar bear biologist served as an intermediary between the local HTOs of Clyde River and Broughton Island and the GNWT. This chain of decision-making is typical of state approaches to managing wildlife, as we saw in the literature review in chapter two. At the community level, negotiation effort was dedicated to the establishment of a hunting boundary between the two communities. Clyde River in particular was hesitant to accept the polar bear biologist's assertion that the polar bear population was in decline. Two factors contributed to reaching a final agreement: an understanding amongst hunters that the quotas would return to their original level in 1991 after the population had time to recover, and the compensation package that the GNWT offered the HTOs.

CHAPTER 6

CULTURAL VARIABLE

6.1 Introduction

This chapter is concerned with evaluating the cultural dynamics that influenced the formation of the 1985 Northeast Baffin Polar Bear Management Agreement. The data are taken from published sources, unpublished data, interviews, and field notes. Figure 6.1 illustrates the variable, data sources, and level of analysis relevant to this chapter.

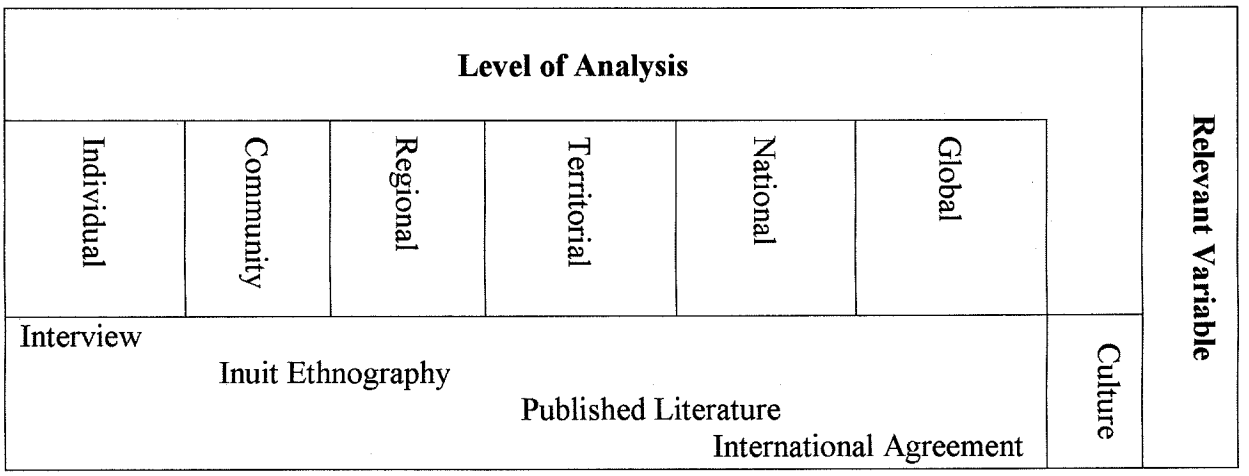

Figure 6.1: Relevant variable, data source, and level of analysis for chapter 6

6.2 National and Regional Level of Analysis

The global level of analysis is not elaborated since the purpose of this chapter is to explore the cultural context at the level of the community. The two communities of Clyde River and Broughton Island are part of the Baffinland Eskimo grouping (Kemp 1984). In 1980 the Baffinland Eskimo were divided into six centralised communities of Clyde River (population 443), Broughton Island (378), Pangnirtung (839), Frobisher Bay (2,333), Lake Harbour (252) and Cape Dorset (784) (Kemp 1984). Kemp (1984: 463) points out that "an active use of the land and close kinship ties still characterise these smaller settlements, and the Eskimo language continues to be spoken by adults and children". This section provides a brief overview of the cultural relationship between Inuit and animals.

6.2.1 Inummariit: The Real Eskimos

A good starting point to examine Inuit perception of animals in social and ideological terms is an investigation of how Inuit define themselves. Brody (1975) provides an analysis of the terms *Inuk,* which means 'a person' in Inuktituk. The plural, *Inuit,* means 'persons', but it is used to refer to the Inuit as a culture, and so means 'the people'. The term *Inummariit* refers to the plural of 'a genuine *Inuk*', or 'a real person' (Brody 1975). Brody (1975: 142) says, "Inuit conceptions of tradition lie within the compass of the meaning of *Inummariit*, [and] the common use of these terms displays a strong consciousness of tradition".

A characteristic of *Inummariit* is the consumption of country food. The eating of country food is often expressed as a quintessential *Inummariit* activity. Brody (1975) says that the *Inummariit* favour sea mammal meat above all others, that they prefer their food raw and enjoy it rotten. "In the settlement, many Inuit still affirm these preferences,

and a group who are expressively enjoying what they consider to be real food will comment on how good it is to eat *Inukttut*, that is, 'as an *Inuk*' (Brody. 1975: 142). Moreover, the importance of country food lies in its ability to protect a person against cold and hunger. The consumption of country food is thus a source of cultural identity, as well as being necessary to physical well being.

Brody (1975) describes the relationship between Inuit and animals in the following way: dependence means that hunters must kill animals in order to survive. If animals evade the hunter or go away, the people will starve or suffer. The relationship between the hunter and the hunted has a quality of vulnerability and implies that, ultimately, people cannot be superior to animals (Brody 1975).

Feinup-Riordan (1990, 1994) asserts that the Yup'ik considered both humans and animals to be included in society, so that neither was dominant over the other. Rather, they viewed the "relationship between humans and animals as collaborative reciprocity by which the animals gave themselves to the hunter in response to the hunter's respectful treatment of them as non-human persons" (Feinup-Riordan 1994: 50).

The place of animals in the spirit world ensures that they are dependent on the hunt; they agree to be killed. "All northern hunters insist that if animals are not treated with respect, both when alive and dead, they will not allow themselves to be hunted" (Brody 1987: 73). Hunting is thus a form of contract between partners.

> Many Inuit say that animals that are not hunted will decline in number. People have an obligation, therefore, both to respect the animal that is willing to die and to hunt animals to ensure that their species will thrive. In this double approach to animals, many hunting peoples express and seek to resolve a tension between respecting and killing animals. For them, respect is a system of wildlife management that includes harvesting (Brody 1987: 77).

Hunters take attitude and intent very seriously (see Wenzel 1983). Dorais (1997: 73), says that some people amongst the Arctic Quebec Inuit believe "that the seal's soul is

so pleased by the respect it is shown that when reborn it will allow itself to be caught again by the same hunter". Wenzel (1991) says,

> Attitude is seen at Clyde as a reflection of the equal and joint roles of humans and animals in the ecosystem. Animals are to be respected, not because they are superior to humans, but because they, like us, are sentient beings. Being *silatujuk* (intelligent), animals are aware of the thoughts, speech, and actions of hunters (pg.138).

This awareness provides animals with information so that they may choose to participate or not in encounters with humans.

6.2.2 Social Structure

As a bridge between the previous discussion of cosmological beliefs and social structure, Feinup-Riordan (1983) explains,

> Power does not reside in the hunter himself. It resides in the context of his relationship with the seal. And this relationship, established outside the village, is the precondition for life inside the village" (pg. 175).

Country food is primarily shared and distributed through a kin network. Adding to the complexity of understanding how food is shared in a community, there is significant variance in social practices amongst Eskimo cultures (Damas 1966). However, the purpose of this section is to describe briefly some of the social mechanisms that facilitate the distribution of food resources.

The organisation of social relations is reflected in the organisation of ecological relations (Damas 1963, 1969). It has been shown that kinship structure can provide a valuable tool for understanding Inuit ecological relations (Damas 1969). The system of generalised reciprocity, or sharing, is organised around the extended family (*ilagiit*), and serves to facilitate the flow and distribution of resources within the group. Kinship

structure for Clyde Inuit is identical to that described in Damas (1963: 34-42) for the Igluligmiut (Wenzel 1981).

The term *ningiq* is used by Damas (1963) to refer to the basic system whereby constituent harvesters deposit resources brought into the *ilagiit* (extended family) with the eldest male, who is often referred to as the *isumataq*. Wenzel (1986) states,

> *Ningiq*, known as *tugaguajuq* among Clyde Inuit, has been described by informants as the movement of food 'upward' to genealogically superior kinsmen within the *ilagiit*. In this way, the family leader acts as the repository and allocator of subsistence products entering the *ilagiit* through all active harvesters (pg. 12).

Kinship provides rules for behaviour that directs interpersonal and intergenerational relations towards an efficient and flexible system for managing harvest activity (Wenzel 1986). The author further points out that to associate Inuit and resource harvesting without consideration of the structural aspects of social organisation is to fail to understand that "for Inuit, community encompasses not only a spatial (locality) and material (technology) dimension, but also a temporal (generational) and information (knowledge) dynamic" (Wenzel 1986: 18). There is a feedback between Inuit and the animals that inhabit a shared environment. This feedback is reflected in cultural ideology, cosmology, and social structure.

6.3 Community Level of Analysis

This analysis examines the community cultural dynamic as it relates to polar bear harvesting. The communities of Clyde River and Broughton Island expressed certain concerns and opinions relating the development of the 1985 MOU that may have a basis in their cultural background. The purpose of this section is to investigate the role that the

structure for Clyde Inuit is identical to that described in Damas (1963: 34-42) for the Igluligmiut (Wenzel 1981).

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6.3 Community Level of Analysis

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cultural variable, at the level of the community, played in the creation of the 1985 MOU on polar bears.

The HTO is responsible for the administering of tags (each available quota is called a tag) once quotas for communities are set for the year. All community members that hold a general hunting license are eligible for the award of a tag through a lottery system. An individual may hold his/her tag for a limited amount of time, and if he/she does not get a bear during that time then the tag goes back through the lottery (Interview MN 1998, Broughton Island).

The polar bear hunt is conducted in a social, cultural, and economic context. Some specific examples of the way that the polar bear hunt is conducted are provided below. Wenzel (pers. comm.) notes that there are three types of polar bear hunting:

1) Target: deliberate polar bear hunting, or hunting solely for the purpose of capturing polar bears. Some Clyde hunters may travel for a month hunting only polar bears, returning with multiple catches. This accounts for around 45% of the catches.

2) Opportunistic: this type of hunting was carried out in conjunction with seal hunting. It accounts for another 45% of the captures.

3) Defence: 2-3 bears were taken only for defence purposes, when life was in danger due to a threat from a polar bear. This type of kill may account for between 5-10% of the annual polar bear harvest.

The type of hunting that a hunter may choose relies on a series of cultural considerations that will be examined in the following section.

These various aspects of a polar bear hunt conducted near Resolute Bay elaborate on many of the themes that have been discussed so far: attitude and intent, Inummariit

values, and the distribution of resources through kin networks. The observations of Wenzel (1983) will be discussed by way of an illustration of the cultural concepts that have been explored in this chapter.

Wenzel (1983) discusses three modes of behaviour: the sharing of a polar bear tag between hunters, the attempts to involve the children in the hunt, and the "psychological" approach taken by the hunters. He notes that "the practice commonly followed by hunters who had already shot their bear(s) is to escort inexperienced or poorly equipped men on hunts and to 'set up'a polar bear for them"(Wenzel 1983: 93). Interviews related that the hunter who assisted another was acting in a manner of Inummariit (a real Inuk).

> In discussions about the possible material benefits for the men who shared their skills and gear, the point was made that if the hunters were close kin there might be some sharing of meat, but there was no direct cash exchange. An important fact which came out in other interviews, however, was that a man who rendered assistance was seen by others in the community as "real" Inuk himself. This prestige aspect seemed to be a primary motivating factor"(Wenzel 1983: 93).

Calling this type of tag sharing 'surrogate hunting', Wenzel (1983) observes that it appears to be an extension of the co-operative hunting seen on Northeast Baffin Island. Surrogate hunting may be practised because hunters that are employed in wage labour are unable to participate in polar bear hunting when a tag is available. He says "in interviews, participants took the position that although a man may be engaged in wage labour or hindered by a lack of equipment he still has a right to a polar bear. Further, they indicated that the surrogate hunter receives a certain amount of esteem from others, both for assisting another and for successfully killing a bear"(Wenzel 1983: 93).

Wenzel (1983) also observed the social function of the meat distribution that occurred when the polar bear was transported back to the settlement. He observed that

the distribution of meat according to kin obligations or social obligation followed closely the behaviours as described by Damas (1972) for other Eastern Arctic Inuit.

> Over the next several days, the members of the surrogate hunter's mother's household, the hunter and his family, and six close relatives all shared meals of polar bear at the mother's house. The other Inuit who had received parts of the polar bear shared their meat with their host household at Resolute Bay....It was more difficult to assess the final disposition of money from the sale of the hide; however, I was told that the hunter's brother (who had drawn the tag) was going to use the cash as a deposit on a new snowmobile"(Wenzel 1983: 93).

Another aspect of behaviours observed during the polar bear hunt was that children were consistently included throughout the course of the hunt. Wenzel (1986) explains

> The attempts to involve children closely in the hunt appear to have been related to preparing them as future hunters. The Kuganayuk Isumataq had on previous occasion explained that it was the responsibility of older people to transmit such information to the younger generation (pg. 93).

A third aspect of behaviours relates to the psychological characteristics of the hunter.

> Polar bear hunting stands out in contrast to other Inuit subsistence activities in that it is carried out with marked seriousness. In general, caribou, narwhal, and seal hunts are performed in a relaxed atmosphere; however, bears are approached almost solemnly. Clyde hunters consistently stated that the polar bear was fully as intelligent as a human being and that it understood when it was being ridiculed or belittled. On the 42 polar bear hunts I observed while in the Eastern Baffin area, virtually every hunter reminded me never to joke about bears because to do so would bring misfortune in polar bear hunting"(Wenzel 1983: 94).

6.4 Summary

The regional perspective on the cultural variable of analysis in the case study reveals that the relationship between Inuit and animals is conceptualised in terms of general reciprocity in which animals are understood as non-human persons with intelligence and souls. Harvesting activities are carried out with a proper attitude of

respect, acknowledging that the animal makes a choice to allow itself to be taken by a certain individual. The distribution of country food along kin lines is an integral aspect of Inuit social organisation. Amongst Inuit, community encompasses not just locality and technology, but also a temporal (generational) and information (knowledge) dynamic. It is interesting to note that not only is food shared according to social structure, but polar bear tags are also shared via surrogate hunting.

The purpose of this chapter on the cultural factor of analysis has been to explore the cultural context in which the 1985 MOU on polar bears was created. We have seen that culture has an important impact on the way that Inuit conceptualise their relationship with the environment and polar bears in social and ideological terms. However, we have not seen that the issues explored in this cultural variable were represented in the actual negotiations of the 1985 MOU on polar bears. The reasons for this will be further explored in Chapter Seven on interconnections.

CHAPTER 7

INTERCONNECTIONS

7.1 Critical Review

The information in this case study analysis comes from a variety of sources, including interviews, meeting minutes, unpublished reports, interdepartmental correspondence, personal communications, and published literature. The communication matrix was a critical tool in performing a systematic collection of data while in the field. The data sampling strategies were chosen to reflect the underlying assumption that each level of analysis (from individual to global) is characterised by a representative majority, so that in presenting a sample data set it is possible to evaluate a representative understanding of that factor. This assumption was most challenging at the level of the individual, since sampling techniques (the interview) were personal and thus limited in their relationship to the system as a whole. The collection of data at the level of the individual and community was important in analysing differences between the two communities that could not have been detected through a regional or national scale of analysis.

The major objective in adopting this methodology was to provide a systematic framework in which to integrate various levels of analysis involved in the social and

ecological processes related to the formation of the 1985 MOU on polar bears. The goal was to integrate a representative sample of micro-level elements (individual and community) and macro-level elements (regional, territorial, national and global) into a hierarchical structure and an interrelated analysis (Stonich 1993). A critical review of the data presented in Chapters Four through Six is presented below emphasising the interconnections of the case study.

7.1.1 Review of the Ecological Variable

Chapter Four included a presentation of the data that related to the ecological variable of the case study. The following critical review includes an evaluation of the techniques used in the population estimates generated by the polar bear census methods. The most significant limitation on information concerning the Baffin Bay polar bear population at the time the surveys were conducted was that the degree of exchange between Baffin Island and Greenland was not known. The study area enclosed a small portion of what is now known to be the full range of the population, which includes Baffin Bay and West Greenland (Messier and Ramsay 1992; Taylor and Lee 1995). The studies conducted from 1980-1984 thus included only a small portion of the actual range of the bears in the Baffin Bay population. This methodological problem had significant influence over the final population estimates.

The reliability of the population estimates was further limited by what is termed geographic capture bias. Estimating abundance using the mark/recapture technique relies on evaluating the ratio of marked to unmarked bears observed in a given population. Thus, the technique relies on marking a series of individuals in a population, evaluating the number of marked bears that are returned (either through recapture or kill

information), and calculating an estimate of the total population. The use of this technique requires that the population boundaries are closed, that is, there is no significant immigration into or emigration out of the study area. The radio collars that were deployed in 1985 indicated that the Baffin Bay polar bears demonstrate minimal site fidelity to the study area. By sampling only a small portion of the Baffin Bay population, virtually nothing could be concluded about emigration and immigration within the study area. Telemetry studies that could have documented unbiased movement of animals were not conducted until the mark/recapture portion of the survey had already been conducted.

A further limitation on the estimate of polar bear abundance is that the kill and capture effort was non-random. The mark/recapture technique assumes that both marked and unmarked bears have an equal chance of being recaptured. However, in the Baffin Bay study both the kill and capture efforts were restricted to the land fast ice. Neither the sampling efforts nor the recapture efforts were random, since accessibility to polar bears was limited to the landfast ice. We have seen that polar bears are not restricted to landfast ice habitat during the spring, but rather are distributed along the active floe edge where seal abundance is greatest.

Another limitation on the reliability of the estimated polar bear abundance was that it was logically inconsistent to employ the DeMaster and Stirling (1980) technique to the mark/recapture data. This technique requires that the estimated annual survival rate (and its variance) is constant throughout the study and is the same for marked and unmarked bears, and that it is known. Only when the population growth rate is also known can stable age distributions be analysed for annual survival rates. Using uncorrected estimates of annual survival from age distributions assumes that the

population distribution is stable. However, if the Baffin Bay population was suspected to be in decline (which was the reason for conducting the surveys), then it is illogical to assume that the population age distribution and growth rate is 1.0.

The final management action that was taken was inconsistent with the data. If the population was in decline, as the data indicated, then it was inconsistent to estimate a sustainable harvest from a population that logically has no harvestable surplus. A population that is harvested at the maximum sustainable rate cannot, by definition, increase. If the population estimates were accurate, then a management plan that included the harvesting of the population surplus would have resulted in the exact same numbers at the end of its term. The management plan was logically inconsistent. The second problem with the management action taken was the decision to establish allowable harvests on estimates that were approximately one standard error above the mean. The high degree of uncertainty in the population estimates was not considered when the management plan was being formulated.

7.2.2 Review of the Political Variable

In Chapter Five pointed out that the decision-making structure at the regional, national and global scales was organised in a bureaucratic, vertically stratified arrangement. Interdepartmental correspondence demonstrated how information was transferred vertically with the return transfer of directives. Since the Minister of the Northwest Territories and his representatives were responsible for approving the final terms of the 1985 MOU, the territorial government retained ultimate veto power. The structure of the agreement was established at the regional level, but the details of the agreement were established at the community level.

There was a minimal amount of direct communication between the HTOs and the administrative branches of the territorial government, with the polar bear biologist serving as an intermediary between these two agencies. For the most part administrative responsibility, not decision-making power, was devolved to the local user groups. The HTOs were given the responsibility of negotiating the final terms of the agreement without having any official veto power.

One interview revealed an interesting perspective on the negotiation process: that the HTOs made a strategic agreement in that, by entering into a co-management agreement with the territorial government, the HTOs now assumed shared responsibility for the status of the polar bear population. The agreement assured the HTOs that they would not be held solely responsible for the status of the polar bear population, but rather that the territorial government would assume some responsibility for the impact that hunting may have on the total population. Thus, the 1985 MOU on polar bears was a strategic move by the communities that transferred full accountability for the abundance of the polar bear population to the GNWT. From the community point of view, the 1985 MOU provided for a redistribution of accountability from the individual level to the territorial level.

The concern over the boundary issue negotiated by the two communities deserves some treatment here. It appears that the primary purpose of the hunting boundary between the two communities at Home Bay was to establish clear responsibility. Neither community wanted to be blamed or penalised for an overharvest that was not their fault. While the hunting boundary makes little ecological sense (since the polar bears travel

throughout the study area and even throughout Baffin Bay), it made political sense for some HTO members since it clearly delineated jurisdiction and responsibilities.

7.2.3 Review of Cultural Variable

The Inuit relationship with animals is part of an integrated whole in which animals are perceived as non-human persons. We saw that the relationship between the hunter and the hunted is one of mutual respect whereby the hunter participates in a hunt where attitude and intent are taken very seriously. Clearly stated, "attitude is seen at Clyde River as a reflection of the equal and joint roles of humans and animals in the ecosystem"(Wenzel 1991: 138). The distribution of country food by generalised reciprocity is organised around the extended family and serves to facilitate the flow and distribution of resources within a group. Kinship "serves as an organisational structure that provides rules for behaviour that directs interpersonal and intergenerational relations towards an efficient and flexible system for managing harvesting activity"(Wenzel 1986: 18). We saw that surrogate hunting, whereby polar bear tags are also distributed through this kin network, is thought to be an extension of the cooperative hunting seen on northeast Baffin Island.

The polar bear hunt is part of a cultural context. A management strategy that attempts to modify an individual's behaviour towards a resource for a desired outcome means that it is people who are managed not the resource (Riewe and Gamble1988). A successful management strategy is one that effectively modifies behaviour towards a resource. The proceedings of the 1985 MOU did not include discussions concerning effective methods of behaviour modification that were culturally appropriate. We saw

that the ideological and social relationship between Inuit and animals was not emphasised during the negotiation proceedings, but rather the negotiation meetings were primarily concerned with delegating responsibility, rather than with strategies for determining culturally appropriate means of behaviour modification.

7.3 Discussion

This thesis sought to investigate the area of uncertainty regarding the balance of decision-making power between the Broughton Island and Clyde River HTOs and GNWT. The data presented in the thesis case study demonstrate that the state retained ultimate veto power over the final terms of the 1985 MOU on polar bears. The communities responded to the unequal distribution of decision-making power by negotiating the terms of accountability, represented by the negotiation of a hunting boundary between the two communities. The negotiation meetings for the 1985 MOU on polar bears were dominated by discussions of distributing accountability amongst the user groups. We saw that the cultural factor of analysis played a minor role in the actual negotiation of the 1985 MOU on polar bears. I argue that this is a result of the decision-making structure created by a Territorial government that retained ultimate decision-making power. The resulting management plan did not include culturally appropriate strategies for managing the harvest of polar bears.

The thesis problem was that a co-management approach to wildlife regime formation does not necessarily ensure that decision-making power is equally distributed between all signatory parties. I have concluded that the co-management approach, in the form observed for the 1985 MOU on polar bears, has the effect of redistributing

responsibility between the HTOs, the hunters, and GNWT employees, without altering the ultimate distribution of decision-making power. If the co-management regime does not present mechanisms for redistributing power amongst user groups, then the resulting agreement will not be a compromise between state systems of managing wildlife and aboriginal systems.

The tension between native resource harvesters and non-aboriginal citizens is a persistent condition in the Canadian North. The Territorial government's policy of devolution represented a political response to increasing pressure from aboriginal user groups to exercise more control over their political affairs. In the early 1980s, devolution was primarily concerned with the transfer of administrative responsibility from the top down; that is, from the territorial government towards local-community based organisations. This resulted in a transfer of administrative responsibility without transferring any significant decision-making power to local user groups. In spite of pressure from land claim organisations to establish aboriginal systems of managing wildlife, state systems were not sacrificed in favour of native systems of managing and using wildlife.

The establishment of co-management regimes appeared to be a promising compromise between state and aboriginal systems of managing wildlife. In theory, co-management looked beyond conflicting bids for exclusive control towards collaborative control for mutually beneficial outcomes. However, questions of basic institutional design and power sharing triggered major bureaucratic resistance "at precisely the point where guaranteed rights to be consulted and advised gave way to guaranteed rights of final decision"(Clancy 1990: 87).

The results of the case study suggest two arguments against co-management. The first is that co-management structures, in practice, appear to lessen the ability of native people to pursue their desire for indigenous systems of wildlife management that "they themselves have always demanded for the last fifteen years"(Usher 1986: 117). State regimes, by retaining ultimate veto power and large-scale decision making-power, result in preventing the inclusion of aboriginal systems of managing wildlife by redistributing responsibility, not power. In the 1985 MOU on polar bears, we saw that hunting groups responded to state distribution of responsibility by negotiating for responsibility and accountability (such as a hunting boundary so that they would not be held accountable for a decline in the population). The interrelations between the resource user and the resource are lost in the bureaucratic delegation of accountability and responsibility.

The second but related argument against a co-management regime (as developed in the 1985 MOU on polar bears) is that it may not be an effective method of human behaviour modification. We have noted that management strategies attempt to modify human behaviour for a desired outcome. The negotiation of the 1985 agreement did little to modify human behaviour towards the target resource, but instead did more to modify behaviour between the two communities of Clyde River and Broughton Island in the form of negotiating standards for accountability. Behaviour, which is culturally derived, must be culturally modified in order to effect the desired change in the status of a resource. Usher (1986) argues that the inclusion of aboriginal systems of managing wildlife is not only desired by user groups, but in fact is crucial to an effective strategy of co-management resource regimes.

Polar bear hunting on northeast Baffin Island is an integrated element of Inuit culture that occurs in an ideological, cultural, material, and economic context. If hunting behaviour modification towards a resource is desired (i.e. a reduction in the numbers of bears taken from a population), then the most effective facilitation of this modification would be found within the pattern of Inuit resource extraction. I recommend a resource management strategy that accommodates both aboriginal and state systems of managing and knowing wildlife. The rational approach to understanding polar bear ecology and estimating abundance can be a powerful tool that can serve as an early warning signal of overexploitation before it is too late. However, rational biology is limited in its ability to develop a culturally appropriate strategy that modifies harvesting activity. That is to say, while quotas may be an effective estimate of the allowable harvest from a population of polar bears, they are not culturally appropriate means of modifying hunting behaviour. Co-management is a social strategy for wildlife management.

7.3.1 Challenges

The Nunavut Land Claims Agreement (Agreement 1993: 26) states "there is a need for an effective system of wildlife management that complements Inuit harvesting rights and priorities, and recognises Inuit systems of wildlife management that contribute to the conservation of wildlife and protection of wildlife habitat". The Nunavut Wildlife Management Board (NWMB) was established by the Nunavut Land Claims Agreement to be the institutional organisation that is the main instrument of wildlife management. While recognising that the government retains ultimate responsibility for wildlife management, the NWMB is responsible for all other wildlife management duties, including allocating allowable harvest levels, approving management plans, and

allocating research funding. In addition to the responsibilities of the NWMB, the harvesting activity of Inuit is to be overseen by three Regional Wildlife Organisations (RWO) and the Hunters' and Trappers' Organisations (from the Nunavut Land Claims Agreement, 1993). The RWO is responsible for the regulation of harvesting practices of the HTO, and the RWO board of directors is made up of representatives from the HTO, with a director for each of the three regions in Nunavut. The HTOs of Clyde River and Broughton Island belong to the Qikiqtaaluk Wildlife Board (QWB).

The responsibility of the QWB is to hear requests of the HTOs and to represent these to the NWMB. If the HTOs were to express a desire to conduct research on alternatives to the present management regime in formal terms (written), then funding could be provided to conduct this research. The findings of this study could then be presented to the NWMB by the QWB. An interview conducted with the director of the QWB details the implications that this new structure may have for the polar bear management program.

> Q. Have there been any complaints over the polar bear quotas?
> R. Oh, yes. Everybody, everywhere. There are only 46 allocated quotas in Nunavut. It's not right.
> Q. What do you think the best way [would be to come up with an alternative]?
> R. To come up with a preferred quota system?
> Q. Yes
> R. There's got to be a study. And there's got to be some proper consultation with the communities. Include traditional knowledge, where the polar bears are, the hunting season, females, cubs, all that information has to be gathered, and then... there has got to be some ongoing interviews to analyse what the population is doing. (Interview JA 1997)

Nunavut is structured to accommodate the concerns of the user groups and to represent these concerns to the NWMB. This organisation makes it possible for user groups to reformulate the polar bear management strategies that reflect "an effective

system of wildlife management that complements Inuit harvesting rights and priorities" (Nunavut Land Claims Agreement 1993: 26). The most effective way to create a wildlife management regime that complements Inuit harvesting rights and priorities is to incorporate traditional knowledge, hunting patterns and the characteristics of the relations between polar bear hunting and social structure into a management strategy.

CHAPTER 8

CONCLUSION

8.1 Conclusion

The research problem is that a co-management approach to wildlife regime formation does not necessarily ensure that decision-making power is shared equally amongst all parties. The actual application of the co-management approach often does not resemble its theoretical construction, commonly resulting in a situation where government agencies are unwilling to give up their decision making power and user groups are reluctant to participate in a management program over which they have no control. As a result, many of the goals and objectives of the signatory parties in a co-management regime remain either unmet or unresolved. It is unknown whether the root of this problem lies in the institutional structure of co-management as a wildlife management regime, in the negotiation process of the management agreements themselves, or in some other area of uncertainty.

The condition of unequal power sharing during the negotiation process of the 1985 Northeast Baffin MOU on polar bears led to the formulation of two arguments against the co-management approach (as it was used for the creation of the 1985 MOU). The first was that the co-management structure, by allowing the state to retain ultimate

veto power and preserving the majority of the decision-making power in the hands of the larger political structures, prevents the inclusion of aboriginal ways of knowing and interacting with wildlife in a co-management structure. The resulting condition, which leads to the second reason for recommending against co-management, is that co-management regimes, as such, may not be the most effective method of behaviour modification. Wildlife management is the practice of human behaviour modification that has a desirable outcome on the status of a wildlife population. The political emphasis observed in the negotiation process shifted the focus away from behaviour modification strategies towards the delegation of administrative responsibility.

I restate that this does not mean that state approaches towards wildlife management are detrimental to user groups; rather I would recommend that the strengths and weaknesses of both the state and aboriginal systems of relating to wildlife be accepted in order to create more effective strategies towards co-management agreements. This means that while the state way of knowing wildlife results in increasingly more accurate population estimates, aboriginal ways of knowing wildlife are well suited to developing effective strategies of human behaviour modification.

8.2 Recommendations

One of the most important issues facing Inuit in Nunavut today is the future of their relationship with their land and resources. User groups, at the level of the community, are in the best position to provide information concerning their own patterns of hunting behaviour. Once this data has been collected, and combined with what biological population surveys have shown about a particular population, effective strategies towards polar bear resource harvesting can be negotiated in a manner that is

satisfactory to all parties concerned. The director of the QWB indicated that the most effective way to alter the existing polar bear management regime is to present studies of the local user knowledge concerning polar bears to the NWMB. The finding of this research essentially supports the recommendations of the director of the QWB.

REFERENCES CITED

AINA (Arctic Institute of North America) 1995. Circumpolar Aboriginal People and Co-Management Practice: Current Issues in Co-Management and Environmental Assessment. Calgary: AINA and Joint Secretariat, Inuvaluit Renewable Resource Committee.

AGREEMENT BETWEEN THE INUIT OF THE NUNAVUT SETTLEMENT AREA AND HER MAJESTY THE QUEEN IN RIGHT OF CANADA 1993. Ottawa: Tungavik Inc. and Indian Affairs and Northern Development.

ARTHUR, S.M., B.F.J. MANLY, L.L. MCDONALD, & G.W. GARNER 1996. Assessing habitat selection when availability changes. Ecology, 77(1): 215-227.

BERKES, FIKRET 1988. Environmental Philosophy of the Chisasibi Cree People of James Bay. IN Freeman M.M.R. and L.N. Carbyn [Eds.]. Traditional Knowledge and Renewable Resource Management. Edmonton: Boreal Institute for Northern Studies.

BETHKE, R., M. TAYLOR, S. AMSTRUP, F. MESSIER 1996. Population delineation of polar bears using satellite collar data. Ecological Applications, 6(1): 311-317.

BRODY, H. 1975. The People's Land: Inuit, Whites and the Eastern Arctic. 1991 reprint. Toronto: Douglas and McIntyre.

-1987 The Living Arctic: Hunters of the Canadian North. Toronto: Douglas and McIntyre.

BROX, O. 1990. The Common Property Theory: epistemological status and analytical utility. Human Organization, 49(3): 227-235.

CLANCY, PETER 1990. Political Devolution and Wildlife Management. IN Devolution and Constitutional Development in the Canadian North. (Ed.) G. Dacks. Ottawa: University of Carleton Press.

DAMAS, D. 1963. Igluligmiut Kinship and Local Groupings: A Structural Approach. National Museum of Canada, Anthropology Series No. 64. Ottawa: Queens Printer.

1966. The Diversity of Eskimo Societies. IN Man the Hunter (Ed.) Lee, R.B. and I. DeVore. Chicago: Aldine.

1969. The Study of Cultural Ecology and the Ecology Conference. IN Contributions to Anthropology; Ecological Essays (Ed.). D. Damas. National Museum of Canada, Anthropology Series No. 86. Ottawa: Queens Printer.

DEMASTER, D., M.C.S. KINGSLEY, AND I. STIRLING. 1980. A multiple mark and recapture estimate applied to polar bears. Canadian Journal of Zoology, 58: 633-638.

DEMASTER, D.P. and I. STIRLING 1981. *Ursus maritimus.* Mammalian Species. American Society of Mammalogists, No. 145, pp. 1-7.

DEPARTMENT OF RENEWABLE RESOURCES 1985a. Preliminary Summary of Polar Bear Research, NE Baffin Island to 1983. Department of Renewable Resources, Iqaluit. Unpublished document.

-1985b. Summary of Northeast Baffin Polar Bear Data. Department of Renewable Resources, Iqaluit. Unpublished document.

-1985c. Summary of Capture and Kill Information from Clyde River. 1985. Department of Renewable Resources, Iqaluit. Unpublished document.

DORAIS, L.J. 1997. Quaqtaq: Modernity and Identity in an Inuit Community. Toronto: University of Toronto Press.

FEINUP-RIORDAN, A. 1983. The Nelson Island Eskimo: Social Structure and Ritual Distribution. Anchorage: University of Alaska Press.

1994. Boundaries and Passages: Rule and Ritual in Yu'pik Eskimo Oral Tradition. Norman: University of Oklahoma Press.

FEIT, HARVEY 1988. Self Management and State Management: Forms of Knowing and Managing Wildlife. IN Freeman M.M.R. and L.N. Carbyn [Eds.]. Traditional Knowledge and Renewable Resource Management. Edmonton: Boreal Institute for Northern Studies.

FERGUSON, S.H. 1998. The Meeting of Two Dynamics: Polar Bears and Sea Ice. Unpublished Ph.D. Thesis: University of Saskatchewan.

FIKKAN, ANNE, GAIL OSHERENKO, ALEXANDER ARIKANINEN 1993. Polar bears: the Importance of Simplicity. IN Young, Oran and Gail Osherenko (EDS). Polar Politics: Creating International Environmental Regimes. Cornell University Press: Ithica and London.

FINANCIAL MANAGEMENT BOARD 1985. Contribution to the Conservation of Polar Bears. Department of Renewable Resources, Government of the Northwest Territories, Yellowknife, NT. Memorandum, used with permission.

FREEMAN, MILTON M.R. 1989. Graphs and Gaffs: A Cautionary Tale in the Common Property Resources Debate. IN Berkes, F. (Ed.) Common Property resources: Ecology and Community-Based Sustainable Development. London: Belhaven Press.

–1996. Polar Bears and Whales: Contrasts in International Wildlife Regimes) IN Issues in the North (Eds.) Jill Oaks and Rick Riewe . Occasional Publication Number 40. Winnipeg: University of Manitoba Press.

GUNN, A., G. ARLOOKTOO and D. KAOMAYOK. 1988. The Contribution of the Ecological Knowledge of the Inuit to Wildlife Management in the Northwest Territories. IN. Traditional Knowledge and Renewable Resource Management. (Eds.) Freemen M.M.R. and L.N. Carbyn. Edmonton: Boreal Institute for Northern Studies

HAMMILL M.O., AND T.G. SMITH 1989. Factors affecting the distribution and abundance of ringed seal structures in Barrow Strait, Northwest Territories. Canadian Journal of Zoology, 67: 2212-2219.

HARDIN, GARRETT. 1968. The Tragedy of the Commons. Science, 162(2): 1243-1248.

HARINGTON C.R. 1968. Denning habits of the polar bear (*Ursus maritimus Phipps*). Canadian Wildlife Service Report Series No. 5. Ottawa.

INTERVIEW WITH LK. Interview by Christy Davis, Broughton Island, 26 June, 1997.

INTERVIEW WITH JA. Interview by Christy Davis, Iqaluit 10 July, 1997.

INTERVIEW WITH LI. Interview by Christy Davis, Clyde River 2 July, 1997.

INTERVIEW WITH MA. Interview by Christy Davis, Clyde River 3 July, 1997.

INTERVIEW WITH EK. Interview by Christy Davis, Broughton Island 18 July 1998.

INTERVIEW WITH BA. Interview by Christy Davis, Broughton Island 20 June, 1998.

IQAQRIALU, DAVID 1986. Nuisance Bears. Tabled document No. 3-86(1) on 14/02/86. Northwest Territories Legislative Assembly, Yellowknife, NWT.

IUCN 1985. Polar Bears: Proceedings of the Eighth Working Meeting of the IUCN/SSC Polar Bear Specialist Group, 15-19 January, 1981. International Union for Conservation of Nature and Natural Resources; Switzerland.

KEMP, WILLIAM B. 1984. Baffinland Eskimo. IN Handbook of North American Indians Volume 5, (Ed. David Damas). Washington, D.C.:Smithsonian Institution.

KILABUK, M.R. 1981. Baffin Region – Increase in Polar Bear Quotas. Question 55-81(1) asked on February 13, 1981. Northwest Territories Legislative Assembly, Yellowknife, NWT.

LARKIN, P.A. 1977. An Epitaph for the Concept of Maximum Sustained Yield. Transactions of the American Fisheries Society. 106(1): 1-11.

LEE, J. 1982. Polar Bear Tagging, Clyde River, August 1980. N.W.T. Wildlife Service Report.

LEE, J, AND R.E. SCHWEINSBURG. 1982 a . Polar Bear Tagging, Clyde River and Broughton Island, Spring 1981. N.W.T. Wildlife Service Report.

1982 b . Polar Bear Tagging, Clyde River, Spring 1982. N.W.T. Wildlife Service Report.

1985 . Polar Bear Tagging, Clyde River and Broughton Island, April May 1984. N.W.T. Wildlife Service Report.

LENTFER, J. 1968. A technique for immobilising and marking polar bears. Journal of Wildlife Management, 35: 27-36.

LENTFER, J. 1976.Agreement on Conservation of Polar Bears. Polar Record, 17(108): 327-330).

LLOYD, K. 1986. Co-operative Management of Polar Bears on Northeast Baffin Island. Alberta Society of Professional Biologists (unpublished address).

LLOYD, K. TO CHIEF OF WILDLIFE MANAGEMENT. June 9, 1983. Recommended Course of Action - - NE Baffin and Foxe Basin Polar Bears Management and Research. Government of the Northwest Territories, Department of Renewable Resources Iqaluit, NT. Memorandum, used with permission.

McCAY, B.J. and ACHESON (eds.). 1988. The Question of the Commons: The Culture and Ecology of Communal Resources. Tucson: University of Arizona Press.

MEMORANDUM OF UNDERSTANDING ON POLAR BEARS. 1985. Unpublished document, Iqaluit, NT, Department of Renewable Resources.

- 1991. Unpublished document, Iqaluit, NT, Department of Renewable Resources.

MESSIER F., M.K. TAYLOR, M.A. RAMSAY. 1992. Seasonal activity patterns of female polar bears (Ursus maritimus) in the Canadian Arctic as revealed by satellite telemetry. Journal of Zoology, 226: 219-229.

MESSIER F., M.K. TAYLOR, M.A. RAMSAY 1994. Denning Ecology of Polar Bears in the Canadian Arctic Archipelago. Journal of Mammalogy, 75(2): 420-430.

NACHIMAS, D. and C. NACHIMAS 1976. Research Methods in the Social Sciences. New York: St. Martin's Press.

NAKASHIMA, D.J. 1991. The Ecological Knowledge of Belcher Island Inuit: A Traditional Basis for Contemporary Wildlife Co-Management. Ph.D. Thesis. McGill University: Montreal.

NOTZKE, C 1994. Aboriginal Peoples and Resource Management in Canada. North York: Captus University Press.

OSHERENKO, GAIL 1988 a The Prospects for Co-Management in the Canadian Arctic. CARC Policy Paper: Ottawa.

-1988 b. Wildlife Management in the North American Arctic: the Case for Co-Management. IN Traditional Knowledge and Renewable Resource Management. (Eds.) Freeman M.M.R. and L.N. Carbyn Edmonton: Boreal Institute for Northern Studies

OSTRUM, E. 1988. Institutional Arrangements for Resolving the Commons Dilemma: Some Contending Approaches. IN The Question of the Commons: The Culture and Ecology of Communal Resources. (Eds.) McCay, B.J. and J.M. Acheson Tucson: University of Arizona Press.

PINKERTON, E. 1992. Translating Legal Rights into Management Practice: Overcoming Barriers to the Exercise of Co-Management. Human Organization, 51(4): 330-341.

RAMSAY M.A., and I. STIRLING 1986. On the mating system of polar bears. Canadian Journal of Zoology, Vol. 64: 2142-2151.

RIEWE, RICK AND LLOYD GAMBLE 1988. The Inuit and Wildlife Management Today. IN Traditional Knowledge and Renewable Resource Management. (Eds.) Freeman M.M.R. and L.N. Carbyn. Edmonton: Boreal Institute for Northern Studies

SCHWEINSBURG TO DEPUTY MINISTER July 11 1983. Report on meeting with Broughton and Clyde HTA's re: Polar Bear Research results July 5, 1983, Broughton Island. Government of the Northwest Territories, Department of Renewable Resources Iqaluit, NT. Memorandum, used with permission.

SCHWEINSBURG TO LLOYD. 11 September 1984. Summary of Meeting with Clyde River and Broughton Island Hunters'and Trappers'Assosciations, 18 July 1984. Wildlife Management Division. Government of the Northwest Territories Iqaluit, NT. Memorandum, used with permission.

SCHWEINSBURG TO LLOYD. 1 April 1985. Summary of Meeting with Clyde River – Broughton Island HTA's – 26 Feb. 1985. Wildlife Management Division,

Government of the Northwest Territories, Iqaluit, NT. Memorandum, used with permission.

SMITH T.G. 1980. Polar bear predation of ringed and bearded seals in the land-fast sea ice habitat. Canadian Journal of Zoology, 58: 2201-2209.

STIRLING I. 1990. Updated Status Report on the Polar Bear (*Ursus Maritimus)* in Canada. Committee on the Status of Endangered Wildlife in Canada. 21 pp.

- 1988 The Polar Bear. Ann Arbor Press: Michigan.

-1986 . Research and Management of Polar Bears *Ursus Maritimus.* Polar Record, 23 (143): 167-176.

-1974. Midsummer observations on the behavior of wild polar bears. Canadian Journal of Zoology, 52: 1191-1198.

STIRLING I. W. CALVERT, D. ANDRIASHEK 1980. Population ecology studies of the polar bear in the area of southeastern Baffin Island. Occasional paper Number 44: Canadian Wildlife Service: Edmonton, Alberta.

STIRLING I., D. ANDRIASHEK, & W. CALVERT. 1993. Habitat Preferences of polar bears in the western Canadian Arctic in late winter and spring. Polar Record, 27:13-24.

STONICH, S. 1993. "I am Destroying the Land!": The Political Ecology of Poverty and Environmental Destruction on Honduras. Westview Press: Boulder.

SWENSON J.E., F. SANDEGREN, A. SODERBERG, A. BJARVALL, R. FRANZEN, P. WABAKKEN. 1997 Infanticide caused by hunting of male bears. Nature, 386 (6624): 450-451.

TAYLOR, M. 1997. Personal Communication. Department of Renewable Resources, Government of the Northwest Territories: Iqaluit, Nunavut.

1998. Personal Communication. Department of Renewable Resources, Government of the Northwest Territories, Iqaluit, Nunavut.

TAYLOR, M., T. LARSEN, R.E. SCHWEINSBURG 1985. Observations of Intraspecific Aggression and cannibalism in Polar Bears (*Ursus Maritimus).* Arctic, 38 (4): 303-309.

TAYLOR, M. AND J. LEE 1995. Distribution and Abundance of Canadian Polar Bear Populations: A Management Perspective. Arctic, 48 (2): 147-154.

THERBERGE, J.B. 1981. Commentary: Wildlife Conservation and Canada's North. Arctic, 34(2): 103-107.

USHER, PETER J. 1981. Sustenance or Recreation? The future for Native Wildlife Harvesting in Canada. IN Freeman M.M.R. [Ed.] Proceedings of the First International Symposium on Renewable Resources and the Economy of the North. Ottawa: Arctic Committee of Universities for Northern Studies.

-1984. Property Rights: The Basis of Wildlife Management. IN National and Regional Interests in the North: The Third National Workshop on People, Resources, and the Environment North of 60. Ottawa: Canadian Arctic Resources Committee.

-1986. The Devolution of Wildlife Management and the Prospects for Wildlife Conservation in the Northwest Territories. Ottawa: Canadian Arctic Resources Committee.

WENZEL, G.W. 1981. Clyde Inuit Adaptation and Ecology: The Organization of Subsistence. Canadian Ethnology Service Paper No. 77: National Museum of Canada: Ottawa.

1983. Inuit and Polar Bears: Cultural Observations from a Hunt Near Resolute Bay, N.W.T.. Arctic, 36(1): 90-94

1986. Resource Harvesting and the Social structure of Native Communities. Alberta Society of Professional Biologists. Edmonton: Indian and Northern Affairs Canada.

1991. Animal Rights, Human Rights: Ecology, Economy and Ideology in the Canadian Arctic. Toronto: University of Toronto Press.

1998. Personal Communication. Clyde River, NT.

WERNER, O. AND G.M. SCHOEPFLE 1987. Systematic Fieldwork: Foundations of Ethnography and Interviewing. Sage Publications: London.

YOUNG O. 1982. Resource Regimes: Natural Resources and Social Institutions. Berkeley: University of California Press.

YOUNG O. and G. OSHERENKO. 1993. Polar Politics: Creating International Environmental Regimes. Ithica and London: Cornell University Press.

APPENDIX A

Place names in the Clyde River region (from Wenzel 1981)